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FOUNDRY TRADE JOURNAL
Established 1902
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## A Wartime Conference

The 40th Annual General Meeting of the Institute of British Foundrymen, which was held at the Waldorf Hotel, London, last Saturday, managed, by the best of good organisation, to partake of the nature of a conference. It was reinforced a little by the holding of numerous committee meetings on the Friday afternoon and evening, and even as late as 10 o'clock that day Mr. Gardom staged a film-show depicting the quantity production of a manganese steel casting.

Mr. Daniel Sharpe, who was elected to the presidency of the Institute, is well known on both sides of the Atlantic as a progressive foundryman. He indicated in his address that he required the co-operation of the various committees to attack the dust and dirt problems arising from foundry practice. Mr. D. Howard Wood retains the office of Senior Vice-President, for it is the intention of the Institute to stage, as soon after the war as is conveniently possible, a full-dress convention in Birmingham—Mr. Wood's home city. Mr. J. W. Gardom, who has for so many years so ably directed the Technical Committee work of the Institute, was elected the Junior Vice-President, but the period of his occupancy of the chair will depend upon the course of the war. The Annual Report presented by Major Miles, the retiring President, received general approbation as it revealed a record membership of 2,602, which probably makes it the largest of the British Institutes catering for metallurgical interests. Moreover it disclosed that extreme activity was prevalent in all areas except one. The Balance Sheet is equally satisfactory, but it should be pointed out there is every appearance that the projected post-war activities will require heavier financial support than in the past.

Great enthusiasm greeted the announcement that the E. J. Fox Medal had been awarded to Mr. W. B. Lake, J.P., whose pioneer work in connection with steel castings is universally acknowledged and appreciated. By a coincidence, Mr. C. H. Kain, his co-director and works manager, was awarded the Oliver Stubbs Gold Medal. His work, spread over a decade, has gained for him a rightful place in the forefront of metallurgists concerned with the production of steel castings. The last of the Institute's major awards—the Meritorious Service Medal—was made to Mr. A. Hares for his work for the Institute, which culminated this year in the establishment of a new Branch at Bristol. The Edward Williams lecture, which showed the very considerable contribution the steelfoundry industry had made to marine engineering, was given by Dr. S. F. Dorey, the chief engineer surveyor to Lloyd's Register of Shipping. He prophesied that the industry would never again be called upon to make the gargantuan castings such as went into the construction of the "Queen Elizabeth" and the other great transatlantic liners, and though there would be competition from welding, there would be in the future increased use of steel castings at the expense of cast iron.

After luncheon, at which about 200 members were present, three simultaneous sessions were held, covering the fields of cast iron and related subjects, non-ferrous metals and steel castings. In the near future we shall review the tendencies expressed in these sessions at which ten Papers were presented—a wartime record. So successful was the wartime meeting, shorn as it was of all social frills, that it reinforces the strength of our oft-expressed opinion that such events, if held in the spring in London, would in peacetime materially benefit the foundry industry, retaining, of course, for the autumn a second one carrying the normal social events and works visits to be held in the provinces or abroad.

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## CORRESPONDENCE

*[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]*

### The Place of Scientists in the Community

*To the Editor of* THE FOUNDRY TRADE JOURNAL.

SIR,—Most scientists find themselves in agreement with the pleas which are now being made that the scientific effort, so effective in the war, shall not be allowed to cease when peace returns, but shall be applied to the serious problems which will arise during reconstruction, and after. It is certain that if, in this small island, with its limited material resources, we are to maintain our existing population with its present standard of living, scientific and technological research will be required on a scale not yet envisaged. Many responsible scientists, however, view with concern exaggerations which often accompany reasonable claims. From time to time, statements are made by individuals, or by organisations, professing to speak for Science, that if some fraction of the national income were allocated to scientific research, and if men of science were given a position of authority in the affairs of the State, the community would find itself in what is usually described as "an age of plenty." It is unfortunate that such exaggerations should be disseminated when schemes for future reorganisation are being discussed. To mislead the community as to its available resources can only foster illusions and bring disappointments which may be disastrous both for it and for Science. While we may hope that the improvement in our material comforts, which has marked the past fifty years, will be continued by further applications of scientific methods, the fruits of research sometimes ripen slowly and our material resources during the post-war period cannot be vastly greater than those we now possess. Because of the time-lag in the application of research, it is important that immediate preparation be made for reconstruction.

The claim that the scientist, as scientist, is entitled to some position of exceptional authority in deciding the policies of governments, is one which cannot and should not be accepted in a democratic community. Social problems are too complex to be solved by any one type of mind. The man of science can give valuable assistance in solving problems facing a society by searching out the facts and, on the basis of the facts, suggesting remedies. He could profitably be consulted more frequently than has been the case. When, however, his advice has been given, his duty as a scientist is at an end. No social problem can be solved solely by the methods of Science; not only material but other values are involved, and it is for the community, of which the scientist is a member, to weigh the different factors and make a decision. A scientific and soulless Technocracy would be the worst form of despotism.

Yours faithfully,

ROBERT H. PICKARD,
Chairman, Joint Council of Professional Scientists.

ALEXANDER FINDLAY,
President, The Royal Institute of Chemistry.

W. L. BRAGG,
President, The Institute of Physics.

## NEW PUBLICATIONS

**Tin and its Uses.** Published by the Tin Research Institute, Fraser Road, Greenford, Middlesex.

"Tin and its Uses" (No. 14) has just been published, after an interval of some ten months. This longer interval between issues, it is explained, is due to two factors: the paper shortage and the tin shortage. The present issue discusses the future of tin in some of its major uses, *e.g.*, tinplate and solder, with particular reference to the effect on post-war markets of the substitutes and modified techniques which have been adopted to meet the tin shortage. It is shown that, in general, efforts to use less tin have involved higher working costs of lower service value. An article on tin in bearing alloys explains the relative merits of tin-rich bearings and the various alternatives. Illustrations show the "Typhoon" and "Beaufighter" aircraft and the "Churchill" heavy tank, all of which are driven by engines fitted with tin-rich bearings. More space than usual is devoted to reviews of the Institute's technical publications which, in view of the paper shortage, have not been distributed so widely as in the past. Copies of "Tin and its Uses" No. 14 may be obtained free of charge from the issuing house.

**Photography as an Aid to Scientific Work.** Published by Ilford, Limited, of Ilford, London.

Until the reviewer had scanned this most interesting 16-page brochure, he had never quite visualised the really important rôle which photography plays in industry, though, of course, he was not unmindful of its use in metallurgy and kindred sciences. What is pleasing is that the issuing house has a real appreciation of the users' needs, and has classified them in a way which will be much appreciated.

**Detachable Fused Tee Boxes.**—A well-illustrated brochure received from British Insulated Cables, Limited, Prescot, Lancashire, details all the technicalities of these useful adjuncts to the proper planning and layout of engineering shops. Especially useful are the data given for their installation.

### Metal Economies

The simplified production of tanks and motorised transport has saved 2,500 short tons of nickel, 1,750 tons of chrome, and over 500 tons of molybdenum, states the vice-chairman of the U.S. War Production Board. Conservation, simplification or substitution have spread out the supply of raw materials in a large number of other cases.

# THE INSTITUTE OF BRITISH FOUNDRYMEN

## ANNUAL GENERAL MEETING, 1943

*New Medal Awards and Election of Officers*

The fortieth annual general meeting of the Institute of British Foundrymen was held at the Waldorf Hotel, London, on Saturday, June 26, Major R. Miles, M.Eng., the President, in the chair. The minutes of the annual general meeting held in London on June 20, 1942, were taken as read and were confirmed and signed.

### Report of Council

The Report of the Council for 1942-43 was presented, the President drawing attention to the satisfactory financial position and to a substantial increase in membership during the year. He also mentioned the establishment of the British Foundry Medal and said that the two paragraphs in the Report dealing with "Branch Activities" very modestly recorded a great deal of work which had been done, often at the sacrifice of time and leisure by the Branch officers, to whom he expressed the gratitude of the Council and members, whose thanks also were due to the continued efficiency and courtesy of the secretarial staff. Mr. Makemson would probably endorse a special reference to Mr. Bolton, the acting secretary. The President then moved the adoption of the Report.

MR. V. C. FAULKNER said it gave him much pleasure to second the adoption of a Report which was excellent in every respect. The Report was unanimously adopted without discussion.

### Accounts

MR. S. H. RUSSELL (Hon. Treasurer), presenting the Balance Sheet at December 31, 1942, and the Statement of Accounts for the year ended December 31, 1942, and moving their adoption, said it would be agreed that the financial position was very satisfactory. There had been another record increase in the membership and the total receipts from subscriptions were £3,339 against £3,238. Interest on investments and deposits at the bank went up to £133 against £98. Turning to the expenditure side of the Income and Expenditure Account, he said the excess of income over expenditure was £708 against £864 in the previous year, and members might wonder why, in spite of an increased income, the balance was less. This was mainly due to increased activity in several departments of the Institute. The Branch expenses had gone up practically everywhere and so had other expenses and he felt it was the right policy to spend money in this way in the interests of the work of the Institute. Five years ago they were getting worried because it did not appear that the income would meet the expenditure but that position had now been reversed.

MR. W. B. LAKE seconded the motion for the adoption of the Accounts. There were no questions and the motion was carried unanimously.

### Report of the Technical Committee

MR. J. W. GARDOM, Convener of the Technical Committee, in presenting the 11th Annual Report of this Committee, said that apart from what was stated in the annual report of the Council, in the report of the Technical Committee there was a point he wished to mention and that was the attendance of the representatives of the Technical Committee on such bodies as the Association of Bronze and Brass Founders and the British Standards Institution. The latter had just decided to appoint a further Committee known as ME 22 to consider the standardisation of moulding boxes, sand testing equipment, etc. During the past year some members of the Institute had been asked to give information with regard to silicosis, but, unfortunately, it had not been found possible to proceed with that enquiry. Everyone would receive a communication and the details supplied would be given in the next Report. As regards fuel economy in foundries, there might have been criticisms of this campaign, but personally he regarded it as one of the best efforts of the Committee, and it was all done in three meetings, which must be a record for this sort of work. He thanked all those who had assisted in this. It had been said that foundries were doing all that was recommended, but he assured the members that every foundry was not doing it, and somebody would call on them and show them where they were not doing it and how it should be done. He moved the adoption of the Report.

MR. P. A. RUSSELL, B.Sc. (Deputy Convener), seconded the adoption of the Report. The Report was unanimously adopted, the President remarking that the Committee had done extremely good work especially during the war years.

### Oliver Stubbs Gold Medal

The PRESIDENT said the Council had decided to award this medal to Mr. C. H. Kain. Mr. Kain became a member of the London Branch in 1927. He had presented many Papers to the Institute and was the author of the official exchange Paper to the American Foundrymen's Association in 1942. He was a past-President of the London Branch and had been awarded a Diploma. Many of his Papers contained the results of original research. He was elected Convener of the Steel Castings Sub-Committee of the Technical Committee in 1935 and had held that office ever since. The medal was then presented to Mr. Kain.

MR. C. H. KAIN said that any success he might have had in the affairs of the Institute was due entirely to

## Institute of British Foundrymen

two things. The first was the necessity for keeping up with the very rapid pace set by his chief, Mr. Lake, and the second was the help he had had from his colleagues at Braintree, and especially his colleagues on the Council of the London Branch who had the very happy knack of making the work of the Institute something worth while and not something apart.

### The E. J. Fox Gold Medal

The PRESIDENT said that, on the recommendation of the assessors, the Council had unanimously resolved to award the E. J. Fox Gold Medal for 1943 to Mr. W. B. Lake (loud applause). In asking Mr. Fox to make the presentation, he expressed thanks to him for continuing to display his interest in the Institute by attending personally to make this presentation.

MR. E. J. FOX said it was doubtful whether there was anybody in this country who had done so much for foundry practice generally as Mr. Lake, and particularly had he assisted in establishing the Institute on really solid foundations. If only for these reasons, everybody was delighted and welcomed Mr. Lake after his illness.

The Medal and Certificate were presented to Mr. Lake.

MR. W. B. LAKE said that when, in 1939, he had the privilege of presenting this medal to Dr. Schwartz of Cleveland, it never occurred to him then or at any time after that he would one day be the recipient of that honour. When, therefore, he was told that it was to be awarded to himself this year, the news gave him one of the greatest and most pleasant surprises of his life. He considered it a very high honour for his name to be added to the list of those distinguished men who had previously received the medal. Some kind and too flattering references had been made to the contribution of himself to the progress in the foundry industry, but he would like to say that any success he had achieved was largely due to the men who had helped him. That they were prominent in the Institute was no coincidence, because for many years all the most progressive technicians in the foundry industry had been members of the Institute of British Foundrymen.

In the early days of crucible melting, and later with the electric furnace, he received great help from the late Daniel Wilkinson. Later he received valuable assistance from Fred Melmoth, now vice-president of the Detroit Steel Castings Company, and Dan Sharpe, President-Elect of the Institute, whilst Colin Kain was now continuing very efficiently the work of his predecessors. Personally, he felt very greatly indebted to these men for the honour that had now been conferred upon him. He thanked Mr. Fox for the kind words he had used in making this presentation, and assured him that to receive the medal from his hands added to his own pleasure in receiving it. He also thanked the members for their cordial reception and expressed regret that indifferent health had obliged him to miss so many meetings, but he assured them that he was, and always would be, deeply grateful for the many kindnesses they had shown him during his long and happy association with the Institute.

### Meritorious Services Medal

The PRESIDENT, announcing that the Council had awarded this medal this year to Mr. C. Hares, said that he had been a very active member of the Institute ever since his election as a member in 1927. It was largely due to his efforts that a Section of the Wales and Monmouth Branch was established at Bristol in 1936, and of this Section Mr. Hares became honorary secretary. During the last seven years he had done much towards promoting the objects of the Institute in the West of England area, thus increasing the importance and membership of the Bristol Section, which, at the beginning of this year, was granted Branch status by the Council. Mr. Hares remained honorary secretary of the Branch. The medal was then presented.

MR. HARES said he regarded the award of this medal not only as an appreciation of his services to the Bristol and West of England Branch—and his own work had not been so very hard—but also as an appreciation of the close co-operation of his Branch Council, whose object was always to further the interests of the Institute throughout the south-west.

### Diplomas

The SECRETARY (Mr. Makemson) announced the award of Diplomas to the following, and said they would be handed to the various recipients in due course at the Branches.

J. Vickers for a Paper on "Aero Engine Castings."

F. Dunleavy for a Paper on "Foundry Technique in Relation to Certain Pressure Castings."

W. Montgomery for a Paper on "Acid Resistance and Technical Control in Enamelling Plants."

W. Gladwell for a Paper on "Radiography as an Aid to Foundry Technique."

W. Brown for a Paper on "Essential Points in the Production of Non-ferrous Castings."

### Establishment of the British Foundry Medal

The PRESIDENT announced that Mr. Barrington Hooper, C.B.E., and the proprietors of the FOUNDRY TRADE JOURNAL, had very generously offered to provide annually a medal for presentation to the author of the best Paper presented to the Institute each year. The Council had had very much pleasure in accepting this munificent offer of Mr. Hooper and his company and, in collaboration with the donor, had drawn up rules to govern the award. The rules were printed in the Report. He asked the members to endorse the Council's gratitude and to show their appreciation.

## ELECTION OF OFFICERS

### President

The PRESIDENT, on behalf of the Council, proposed that Mr. Daniel Sharpe, Junior Vice-President, be elected President for the year 1943-44. Continuing, he said that Mr. Sharpe had had a wide and varied experience in foundry and metallurgical work. He gained his practical metallurgical training with the

Steel Company of Scotland. Later he was appointed manager of the National Steel Foundry Company, Limited, at Leven, Fife, afterwards becoming a director of the company. In 1920, Mr. Sharpe went to the United States of America as a consulting foundry engineer, where he spent more than a year visiting over 100 iron and steel foundries. During this visit Mr. Sharpe became particularly interested in the Sandslinger system of moulding and returned to Britain to develop the European patents of this machine. Mr. Sharpe was President of the Scottish Branch in 1936, when the highly successful Annual Conference was held in Glasgow. At present Mr. Sharpe was Technical Executive (Steel) to Federated Foundries, Limited, and a director of Walter Macfarlane & Company, Limited, Saracen Foundry, Possilpark, Glasgow, and of numerous other concerns.

MR. H. WINTERTON seconded the motion and said it had the support of the members of the Scottish Branch with whom Mr. Sharpe was very popular.

THE PRESIDENT, in putting the motion to the meeting, said that a welcoming telegram had been received from the Scottish Branch. The proposal was carried enthusiastically, and Mr. Sharpe was inducted into the chair, but afterwards asked Major Miles to continue to preside until the end of the meeting.

MR. SHARPE said he would try and live up to all the kind things that had been said about him. The annals of the history of the Institute contained many honoured names, not the least of which would be that of the retiring President, Major Miles, to whom he asked the members to express appreciation of his services during the past two years. There were few Presidents who had shown more activity.

The vote of thanks was given with hearty acclamation.

The retiring PRESIDENT expressed his appreciation of the vote of thanks and said it had been with a certain amount of reluctance that he had been able to take on the office of President for a second year. Now, however, he found almost more reluctance in giving the job up because the work had been so pleasurable.

### Senior Vice-President

MR. F. J. COOK said it gave him great pleasure to propose the election of Mr. D. H. Wood as Senior Vice-President and added that he was perfectly certain that when Mr. Wood took over the office of President, which he understood was to be as soon as the war was over, he would have the support of every member.

MR. C. W. BIGG seconded the motion, which was carried unanimously.

MR. D. H. WOOD said he greatly appreciated the fact that he had again been elected Senior Vice-President. It was the decision of the Council two years ago that he should be put into cold storage until after the war, but he felt a little diffident in holding this office for the fourth year, as he was keeping a better man out of a job. However, as it was the wish of the Council and of the members, he would do his best for the Institute until such time as it was thought fit to displace him.

### Junior Vice-President

MR. D. H. WOOD proposed the election of Mr. J. W. Gardom as Junior Vice-President, on the recommendation of the Council. He said it would not be an exaggeration to say that during the past three years Mr. Gardom had done as much as, if not more than, anybody to increase the production of vitally needed castings, particularly those required for tanks and munitions. In his capacity as chairman of the Technical Committee for five or six years, he had been responsible for an enormous amount of work, and he doubted whether 2 per cent. of the members of the Institute could attempt to keep up with the pace Mr. Gardom set. He had every confidence in submitting Mr. Gardom's name and hoped that, when in due course he occupied the presidential chair, others of them would not be found among the "also rans"!

DR. J. E. HURST seconded the motion, and said he knew Mr. Gardom well enough to be able to recommend him. He knew a great deal about him, but nothing that did not qualify him from ultimately occupying the presidential chair. The motion was carried with enthusiasm.

MR. GARDOM, acknowledging his election, said it was 21 years almost to the day that he joined the Institute at the time he first became associated with foundry production, but he almost felt that his election as Junior Vice-President was a wrench from the back-benchers with whom he had worked so long.

### Election of Auditors and Council Members

On the motion of Mr. H. W. Lockwood, seconded by Dr. A. B. Everest, Messrs. J. & A. W. Sully & Company were re-elected auditors for the ensuing year.

The SECRETARY announced the result of the ballot for five vacancies on the Council, as follows:—L. W. Bolton, V. Delport, Barrington Hooper, E. Longden and P. A. Russell. To fill the vacancy caused by the election of Mr. Gardom as Junior Vice-President, it was agreed to elect Mr. R. B. Templeton, the next on the ballot list, for one year, following the usual practice.

### Council of Ironfoundry Associations

MR. S. H. RUSSELL proposed, and MR. C. H. KAIN seconded, a motion that Major Miles be elected the Institute's representative on the Council of Ironfoundry Associations. The motion was carried unanimously.

MAJOR MILES said he regarded this as a great honour, because for the first time the whole of the ironfoundry trade seemed to be getting together, and that had been due almost entirely to the energy and organising ability of Mr. Fitzherbert Wright.

### Presidential Address

MR. D. SHARPE then took the chair and delivered his presidential address, which has had to be held over to our next issue, owing to pressure on our space.

YOUR WASTE PAPER IS STILL NEEDED !

## THE NEW PRESIDENT

MR. DANIEL SHARPE has had a wide and varied experience in foundry and metallurgical work. He received his early education in various Glasgow schools, and later at what is now known as the Royal Technical College, Glasgow. He gained his practical metallurgical training in the Steel Company of Scotland, Limited, where he spent six years; four in the laboratory and two years as steel melter and sample passer at Blochairn Works, Glasgow. Mr. Sharpe then became chemist and assistant foundry manager with the Acme Steel & Foundry Company, Limited, Shettleston, with whom he remained about two years, when he returned to the Steel Company of Scotland to become metallurgist and assistant steel foundry manager at the Hallside Works, Newton. Later Mr. Sharpe was appointed manager of the National Steel Foundry Company, Limited, at Leven, Fife, afterwards becoming a Director of the Company.

In 1920 Mr. Sharpe went to the United States of America as a consulting foundry engineer, where he spent more than a year visiting over 100 iron and steel foundries. During this visit to America Mr. Sharpe became particularly interested in the Sand-slinger system of moulding, and returned to Britain to develop the European patents of this machine, a direction in which his activities were concentrated for some years.

Mr. Sharpe became a member of the Institute of British Foundrymen in 1920, and was President of the Scottish Branch in 1936 when the highly successful Annual Conference was held in Glasgow. Mr. Sharpe has delivered Papers before practically every Branch of the Institute of British Foundrymen. He is also a member of the West of Scotland Iron and Steel Institute and of the Institute of Vitreous Enamellers.

At present Mr. Sharpe is Technical Executive (Steel) to Federated Foundries, Limited, and is a director of Walter Macfarlane & Company, Limited, Saracen Foundry, Possilpark, Glasgow. He is also Chairman of A. & W. Smith & Company, Limited, Engineers and Manufacturers of Sugar Mill Machinery; Chairman of R. G. Ross & Company, Limited, Steam and Air-Hammer Makers; is a Director of Foundry Plant & Machinery, Limited, and of B.I.A. Patents, Limited. He is also Chairman of Sugar Machinery Association; the Sugar Machinery Export Group, and of the Engineering Section, Glasgow Chamber of Commerce.

## THE EXAMINATION OF CORRODED METAL

### NEW METHODS DEVISED

The possibilities of obtaining more accurate quantitative information from primarily qualitative examinations of corrosion specimens and *vice versa* have been investigated by F. A. Champion, and the results described in a Paper to the Institute of Metals. As a result, a system for macroscopic and microscopic examination and recording of the results so obtained has been devised and is being used successfully.

The system of macroscopic and microscopic examination involves classification of the types of corrosion followed by comparison of the specimen with standard charts of number of sites, size of areas and intensity or depth of attack. The observations may be recorded in a standard though flexible manner by means of standard terms, or better still by numbers and standard abbreviations to give a kind of shorthand description. The method may be applied to examination by the naked eye, by the binocular microscope, or by the projection microscope at higher powers of magnification. Although the comprehensive description of the system possibly makes it appear somewhat complicated, experience has shown that familiarity is soon acquired. It has considerably increased the accuracy and reliability of the qualitative as well as the quantitative results of such examinations by minimising the influence of the personal factor, while the shorthand descriptions permit the collection of results into compact and concise tables for relatively easy assimilation.

The method for quantitative measurement has been mainly concerned so far with the measurement of local corrosion, and has been directed towards the determination of a pitting index, calculated by an arbitrary formula which has been devised to represent mathematically the empirical corroded area-depth curve. The condition of the specimen is recorded on a radiograph from which a series of photographic positives are prepared to represent sections of the specimen at various depths. The corroded area and depth corresponding to each positive are then assessed from the photometric measurements on the positives. Satisfactory measurements of local corrosion have been made on artificial specimens prepared by drilling blind holes to simulate pitting. The measurement of maximum depth and general corrosion requires further investigation. Both methods have been primarily designed for and used with aluminium and aluminium alloys, but the macroscopic and microscopic system at least appears to be readily applicable to other metals.

# ANNUAL REPORT OF THE INSTITUTE OF BRITISH FOUNDRYMEN

*With Eleventh Report of the Technical Committee*

This report covers the period May 1, 1942, to April 30, 1943. The statement of accounts for the year ended December 31, 1942, and the balance-sheet at that date are also included.

### Finance

The subscription revenue for the year again shows an increase over preceding years, and the expenditure is also higher than in 1941, mainly due to the increased activities of the Institute and the larger number of members for which it now caters. It has been possible, however, again to transfer a substantial credit balance to the accumulated fund.

Owing to the delays in the mail, it has not been possible to include in the balance-sheet and income and expenditure account the full accounts of the South African Branch for 1942. There is, however, included in the balance-sheet the sum of £52 1s. 4d. in the hands of the South African Branch Secretary at December 31, 1941, which amount was transferred to the general office during 1942, together with the sum of £50 on account of 1942 subscriptions. These two amounts totalling £102 1s. 4d. are shown as income in the income and expenditure account for 1942.

### Membership

The present position of the membership and the changes which have taken place during the year are recorded in Tables I and II, and it will be noted that there has been a very satisfactory increase in the last twelve months.

The apparent decline in the membership of the Wales and Monmouth Branch is accounted for by the granting by the Council of Branch status to the Bristol Section of that Branch, to which further reference is made under "Branch Activities." It will be noted that the combined membership total for the two Branches is now 186, as against 125 at April 30, 1942.

TABLE I.—*Changes in Membership*, 1942–1943

| | Subscribing firms. | Members. | Associate members. | Associates. | Associates (students). | Totals. |
|---|---|---|---|---|---|---|
| At April 30, 1942 | 80 | 1,008 | 1,180 | 98 | 41 | 2,407 |
| Additions and transfers from other grades | 17 | 129 | 174 | 6 | 5 | 331 |
| | 97 | 1,137 | 1,354 | 104 | 46 | 2,738 |
| Losses and transfers to other grades | 1 | 44 | 60 | 21 | 10 | 136 |
| At April 30, 1943 | 96 | 1,093 | 1,294 | 83 | 36 | 2,602 |

TABLE II.—*Analysis of Membership at April* 30, 1943.

| Branch. | Subscribing firms. | | Members. | | Associate members. | | Associates. | | Associates (students). | | Totals. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Birmingham | 12 | (9) | 167 | (164) | 149 | (155) | 15 | (15) | 5 | (4) | 348 | (347) |
| Bristol | 4 | (—) | 45 | (—) | 42 | (—) | 1 | (—) | — | (—) | 92 | (—) |
| East Midlands | 6 | (5) | 81 | (83) | 157 | (140) | 4 | (3) | 2 | (1) | 250 | (232) |
| Lancashire | 15 | (13) | 131 | (122) | 212 | (199) | 17 | (20) | 1 | (2) | 376 | (356) |
| London | 15 | (10) | 237 | (215) | 149 | (134) | 2 | (3) | — | (—) | 403 | (362) |
| Middlesbrough | 1 | (1) | 36 | (34) | 51 | (48) | 6 | (6) | 12 | (15) | 106 | (104) |
| Newcastle | 6 | (6) | 25 | (28) | 17 | (18) | 21 | (30) | 5 | (7) | 74 | (89) |
| Scottish | 8 | (7) | 106 | (96) | 213 | (194) | 2 | (4) | 2 | (4) | 331 | (305) |
| Sheffield | 6 | (6) | 84 | (83) | 80 | (62) | 2 | (2) | — | (—) | 172 | (153) |
| Wales & Monmouth | — | (3) | 40 | (54) | 45 | (59) | — | (1) | 9 | (8) | 94 | (125) |
| W.R. of Yorks. | 7 | (4) | 68 | (61) | 112 | (104) | 4 | (4) | — | (—) | 191 | (173) |
| South African | 15 | (15) | 50 | (50) | 50 | (48) | 9 | (10) | — | (—) | 124 | (123) |
| Unattached | 1 | (1) | 23 | (18) | 17 | (19) | — | (—) | — | (—) | 41 | (38) |
| TOTALS | 96 | (80) | 1,093 | (1,008) | 1,294 | (1,180) | 83 | (98) | 36 | (41) | 2,602 | (2,407) |

Figures in brackets are totals at April 30, 1942.

## Institutes' Annual Report

It is particularly gratifying to record that there are now more than 400 members attached to the London Branch, and the Council congratulate the Branch on the very satisfactory progress which has been made.

It is with regret that the Council records the death of the following members:—

Mr. E. M. Boote, Member, Lancashire Branch. Elected 1912.

Mr. J. H. Booth, Member, East Midlands Branch. Elected 1919.

Mr. J. H. Cole, Member, Wales and Monmouth Branch. Elected 1939.

Mr. R. Kidston, Member, Lancashire Branch. Elected 1936.

Dr. P. Longmuir, M.B.E., a Founder Member of the Institute. Elected in 1904 and elected an Honorary Life Member in 1936. Past-President of the Institute; Past-President of the Sheffield Branch.

Mr. N. McManus, M.B.E., Member, Scottish Branch. Elected 1930.

Mr. J. McClure Renwick, Member, South African Branch, formerly of the London Branch. Elected 1933.

Mr. H. H. Bennett, Associate Member, Wales and Monmouth Branch. Elected 1933.

Mr. T. N. Goodwin, Associate Member, Scottish Branch. Elected 1933.

Mr. W. Hughes, Associate Member, East Midlands Branch. Elected 1938.

Mr. H. Kirkland, Associate Member, East Midlands Branch. Elected 1941.

Mr. D. Lewis, Associate Member, Birmingham Branch. Elected 1919.

Mr. J. N. McArthur, Associate Member, Scottish Branch. Elected 1928.

Mr. W. D. McCrone, Associate Member, South African Branch. Elected 1939.

Mr. J. Ross, Associate Member, Scottish Branch. Elected 1937.

Mr. W. Taylor, Associate Member, West Riding of Yorkshire Branch. Elected 1927.

Mr. E. Nelson, Associate, Newcastle Branch. Elected 1942.

The Council also records the deaths of the following three members, which took place earlier than 1942, but which have not previously been reported:—

Mr. W. L. Graham, Member, Birmingham Branch. Elected 1938.

Mr. T. Blackadder, Associate Member, Scottish Branch. Elected 1928.

Mr. M. D. Doulton, Associate, London Branch. Elected 1928. Killed in action in August, 1940.

Mr. R. Sutcliffe, Associate Member of the Birmingham Branch, who was serving in the Forces at Singapore, has been reported missing. Mr. J. S. Ferguson, Associate Member, resident in Hong Kong, was taken prisoner while serving with the Hong Kong Volunteer Defence Corps. Capt. P. B. Lake, Associate Member, is a prisoner of war in Italian hands.

Seventy-six members are now serving in H.M. Forces.

### Honours Conferred upon Members

The following are amongst those who have been honoured during the past year:—

Mr. Summers Hunter, J.P. (Member) was knighted in the New Year's Honours list.

Mr. P. H. Wilson (Member) was a recipient of the O.B.E. in the New Year's Honours list.

Squadron-Leader R. B. Newton (Associate Member) was awarded the Distinguished Flying Cross.

Acting Squadron-Leader S. P. Russell (Associate Member) was awarded the Distinguished Flying Cross.

Col. C. A. B. Lindop, J.P. (Member) was appointed Deputy Lieutenant of the County of Staffordshire.

Mr. W. Scott (Member) was appointed a magistrate of Jarrow.

Mr. A. Turner (Member) was appointed a magistrate of the County Borough of West Bromwich.

Dr. Andrew M'Cance (Member) was elected a Fellow of the Royal Society.

Mr. A. J. Murphy, M.Sc. (Member) was elected a Vice-President of the Institute of Metals.

Mr. F. A. Melmoth (Member) was elected Chairman of the Detroit Chapter of the American Foundrymen's Association.

### Awards

*E. J. Fox Gold Medal.*—On the recomendation of the Assessors, Sir W. J. Larke and Dr. J. E. Hurst, the E. J. Fox Gold Medal for 1942 was awarded to Mr. P. H. Wilson, assistant managing director (technical), The Stanton Ironworks Company, Limited, near Nottingham, for his work in the development of the centrifugal casting process in the production of cast-iron pipes. The presentation was made to Mr. Wilson by Mr. E. J. Fox at the annual meeting of the Institute held in London on June 20, 1942.

The Council have re-elected Sir Wm. J. Larke and Dr. J. E. Hurst as Assessors for the E. J. Fox Gold Medal for a further period of three years.

*Oliver Stubbs Gold Medal.*—The Council unanimously awarded the Oliver Stubbs Gold Medal for 1942 to Mr. S. H. Russell, Past-President and Honorary Treasurer, in acknowledgment of the educational work which he had undertaken for many years as Chairman of the City and Guilds of London Institute Advisory Committee in connection with foundry technical education; the contributions which he has made to the discussions on Papers at Branch meetings; his work as Honorary Treasurer of the Institute, and his chairmanship of the Organisation Committee responsible for drafting the proposed new rules.

*Meritorious Services Medal.*—The Meritorious Services Medal for 1942 was awarded to Mr. S. W. Wise, Honorary Secretary of the West Riding of Yorkshire Branch. Mr. Wise served as Registrar and later as Vice-President of the Newcastle Branch; he transferred to the West Riding of Yorkshire Branch in 1923 when he became Honorary Secretary of that Branch, which position he still holds.

*Diplomas.*—Diplomas were awarded to the following members during the year: Mr. A. B. Bill (East

Midlands Branch), Mr. F. G. Butters (East Midlands Branch), Mr. E. J. Kelly (Wales and Monmouth Branch), Mr. J. G. Pearce (Birmingham Branch), Mr. L. W. Sanders (London Branch), Mr. J. Blakiston (West Riding of Yorkshire Branch).

### British Foundry Medal

Mr. Barrington Hooper, C.B.E., and Industrial Newspapers, Limited, have very generously offered to provide annually a medal for presentation to the author of the best Paper presented to the Institute each year. The Council have had very much pleasure in accepting the munificent offer of Mr. Hooper and his company, and in collaboration with the donor have drawn up the following rules to govern the award:—

The award to be known as the British Foundry Medal and to be given to the author of the Paper adjudged by the Council to be the best presented to any meeting of the Institute and accepted for publication in the Proceedings.

A cash award of £10 to accompany the medal, which cash award may, at the discretion of the Council, be divided between the recipient of the medal and any other author or authors adjudged by the Council to be worthy of such award, though perhaps not entitled by merit to receive the medal.

If in any year, in the opinion of the Council, no Paper is of sufficient merit, then either or both the medal and the cash award can be carried forward to the next year or cancelled for that year, at the discretion of the Council.

The award, if made, to take place at the Annual Conference.

The first award will be made at the Annual Meeting, 1944, in respect of Papers to be published in the Proceedings, Volume XXXVI.

### Edward Williams' Lecture

The Edward Williams' Lecture for 1942 was prepared by Dr. H. W. Gillett, of the Battelle Memorial Institute, Columbus, Ohio, whose subject was "Foundry Teamwork." The lecture was presented to the Annual Meeting on behalf of the author by Mr. J. G. Pearce, Director and Secretary of the British Cast Iron Research Association.

### Branch Activities

Full syllabuses of meetings were arranged by the Birmingham, East Midlands, Lancashire, London, Middlesbrough, Scottish, Sheffield, South African, Wales and Monmouth, and West Riding of Yorkshire Branches, and by the East Anglian, Bristol, Burnley, Falkirk, and Lincoln Sections. At most meetings satisfactory attendances have been recorded and the Council desires to place on record their gratitude to the Presidents, Councils, and Secretaries, and to the authors of Papers presented at these meetings. The number of meetings held during the year represented over 80 per cent. of the normal number of meetings held in a peacetime year.

At the October meeting of the Council, an application by the Bristol Section of the Wales and Monmouth Branch to become the Bristol and West of England Branch of the Institute was accepted, and the new Branch formally commenced its activities in January, 1943, when the Council held a meeting at Bristol.

### Educational Work

The following are the results of the examinations held under the auspices of the City and Guilds of London Institute and in conjunction with the Institute in April and May, 1942:—

| | No. of candidates. | Pass 1st class. | Pass 2nd class. |
|---|---|---|---|
| *Patternmaking*— Intermediate grade | 22 | 4 | 9 |
| *Patternmaking*— Final .. .. | 24 | 2 | 12 |
| *Foundry Practice and Science* .. .. | 36 | 7 | 15 |

Buchanan Medals and Book Prizes were awarded to:

PATTERNMAKING—*Final.*

*Silver Medal.*—No award.

*Book Prizes.*—Mr. Alex. S. H. Sawers, external candidate at Denny, Stirlingshire; Mr. John W. Hodgkinson, External candidate at Bradford.

FOUNDRY PRACTICE AND SCIENCE.

*Silver Medal.*—Mr. Alan Percival Scattergood, School of Art, Derby.

*Book Prizes.*—Mr. George D. Brockway, Technical College, Darlington; Mr. Donald S. Broadbent, Technical College, Huddersfield.

### Publications

Volume XXXV of the Proceedings was published in February, 1943, and a number of Papers were circulated to members during the year. Arrangements have been made for a number of Papers to be presented to the Annual Meeting, 1943, and for others to be circulated.

### Kindred Associations

The Institute maintains cordial relations with a number of kindred societies, joint meetings between local Branches of the Institute and a number of societies having been held during the year. It was with pleasure that once again the Council received an Exchange Paper to the 1942 Annual Meeting from the American Foundrymen's Association, the author being Mr. Carl F. Joseph. The 1942 Exchange Paper to the American Foundrymen's Association was prepared by Mr. C. H. Kain and Mr. L. W. Sanders. A similar exchange of Papers is being made to the Annual Meetings of the Association and the Institute in 1943.

The Institute has continued as an Affiliated Member of the Council of Ironfoundry Associations and is represented on the Executive and Finance Committee by the President. Mr. J. W. Gardom, Convener of the Technical Committee, Mr. P. A. Russell, Convener of the Cast Iron Sub-Committee, and Mr.

## Institutes' Annual Report

A. E. Peace, Convener of the Malleable Cast Iron Sub-Committee, continue as representatives of the Institute on the Technical Advisory Committee of the Council.

During the year the Association of Bronze and Brass Founders has been formed and the Institute is represented on the Technical Committee of that Association by the Convener of the Non-Ferrous Sub-Committee of the Technical Committee (Mr. F. Hudson). Mr. G. T. Hyslop (member) is Vice-President of the Association and Chairman of its Technical Committee.

### Ironfounding Industry Fuel Committee

At the invitation of the Ministry of Fuel and Power, the Council of Ironfoundry Associations, with the active co-operation of the British Cast Iron Research Association and the Institute, established the Ironfounding Industry Fuel Committee in October, 1942. The Committee is composed of three representatives of the British Cast Iron Research Association, with Mr. J. G. Pearce as Chairman, and three representatives of the Institute, whose Acting Secretary is Honorary Secretary of the Committee. Mr. W. J. Driscoll, B.Sc. (Eng.) (Associate Member), of the British Cast Iron Research Association, has been appointed full-time Fuel Officer. Since the formation of the Committee fourteen Regional Panels have been formed corresponding with the Regional areas of the Ministry of Fuel and Power. The Branches of the Institute have been intimately associated with the formation of these Regional Panels and in many cases the Honorary Secretaries of the Branches of the Institute of British Foundrymen have been appointed Secretaries of the Regional Panels. To those gentlemen whose commitments must already be heavy, the Council extends its thanks for these extra duties which they have so kindly agreed to carry out.

The work of this Committee is considered to be of the utmost national importance during the war and will no doubt greatly assist the industry towards more efficient operation in post-war years.

The financing of the Committee has been undertaken by the Council of Ironfoundry Associations.

### Council

Four meetings of the Council and nine meetings of the Executive, and other standing Committees have been held in London, Birmingham, Bristol, and Manchester.

Of the ten members of the Council who were elected by ballot for a period of two years, five retire each year. Those who retire at the Annual Meeting to be held in London on June 26, 1943, are Mr. V. Delport, Mr. Barrington Hooper, Mr. E. Longden, and Mr. P. A. Russell. Mr. D. Sharpe, whose term of office expires in 1943, was elected Junior Vice-President in 1942, and is therefore an ex officio member of the Council for 1943-44.

The Council expresses to Mr. S. H. Russell, Past-President and Honorary Treasurer, its grateful thanks for the manner in which he has conducted the Institute's finances during the past year. The Council is also indebted to Mr. J. W. Gardom, who, as Convener of the Technical Committee, has devoted much of his time to the many aspects of the work which the Committee has done.

### Officers

It is expected that at the Annual Meeting in June, the Council will nominate Mr. D. Sharpe as President for 1943/44, and Mr. D. H. Wood for re-election as Senior Vice-President. The Council has nominated Mr. J. W. Gardom as Junior Vice-President for 1943/44, and this nomination will also be placed before the Annual Meeting.

### Annual General Meeting, 1942

The Annual General Meeting was held at the Waldorf Hotel, London, on Saturday, June 20, 1942. After the formal business meeting, Major R. Miles delivered his Presidential Address, which was followed by the presentation of Awards and the Edward Williams Lecture. About 130 members attended the Annual Luncheon, which was followed by two technical sessions.

The Annual General Meeting in 1943 will be arranged on very similar lines and will also be held at the Waldorf Hotel, London, on Saturday, June 26.

### Staff

The Secretary continues to be engaged at the Iron and Steel Control, but is able to keep in close touch with the Institute's work.

The Report is signed by Mr. Richard Miles, President, and Mr. John Bolton, Acting Secretary.

## ELEVENTH ANNUAL REPORT OF THE TECHNICAL COMMITTEE

During the past year four meetings of the Committee and numerous meetings of the Sub-Committees have been held at Birmingham, Manchester, and in London. Brief summaries of the work of the Sub-Committees follow.

*Cast Iron Sub-Committee.*—The Sub-Committee has prepared a report, entitled, "Meeting the Raw Material Supply Position," which is to be presented to the Annual Meeting in June, 1943. The purpose of the report is to assist founders to overcome difficulties associated with the scarcity of low-P, low-C cast iron.

*Non-Ferrous Sub-Committee.*—Following the revision of a number of British Standard Specifications to meet the need for the conservation of tin, the Sub-Committee presented a report on "Low-Tin and Tin-Free Bronzes and Brasses," to the Annual Meeting in 1942. Further work has been done during the year at the request of the Admiralty, particularly the preparation of a report on a copper-antimony-nickel gear alloy developed in Canada. This report is to be presented to the Annual Meeting, 1943.

The Sub-Committee has also collaborated with the British Non-Ferrous Research Association and the Association of Bronze and Brass Founders in the preparation of a report on "Cast Brasses A. and B. (B.S.S. 1025-1028): Substitutes for Gunmetal," which

(*Concluded on page* 182.)

# REPORT ON COPPER-ANTIMONY-NICKEL GEAR ALLOY

By MEMBERS OF THE NON-FERROUS SUB-COMMITTEE OF THE TECHNICAL COMMITTEE

*Submitted to the Fortieth Annual Conference of the Institute of British Foundrymen*

## FOREWORD

This work was undertaken at the suggestion of the Admiralty following receipt of a report from the Hamilton Gear & Machine Company, of Toronto, Canada, outlining the development of a tin-free gear bronze containing approximately 7.0 to 8.0 per cent. antimony, 1.5 to 2.5 per cent. nickel, balance copper, and claimed to be actually superior to the more conventional alloys employed.* Obviously a really good bearing material containing no tin might conceivably be advantageous for many other applications, quite apart from gears, at the present time and therefore the Sub-Committee thought that a useful purpose would be served by conducting one or two trial melts in British foundries in order to gain some idea of the principal characteristics associated with this group of alloys.

TABLE I.—*Solid Phases in the* Cu-Sb *System* (*Shibata*).

| Solid phases. | Chemical formula. | Composition (Wt. per cent. Cu). | Crystal Type. |
|---|---|---|---|
| α | — | 100—95.3 | Face-centred cubic. |
| β | $Cu_2Sb_2$ .. | 56.71 | Body-centred tetragonal. |
| γ | $Cu_2Sb$ .. | 51.08 | Simple tetragonal. |
| δ | $Cu_2Sb_2$ .. | 70.14 | Hexagonal. |
| η | $Cu_{11}Sb_3$ .. | 74.17 | Orthorhombic. |
| θ | $Cu_{11}Sb_4$ .. | 58.95 | Hexagonal. |
| ε | — | Sb* | Hexagonal. |

* Possesses a slight solubility range at high temperatures.

Before commenting on the results obtained some mention might be made of the work of previous investigators on the subject. Apart from that published by the Hamilton Gear & Machine Company, available information is scant and most of this deals with the constitution of the alloys. Up to 1940 the equilibrium diagram of the Cu-Sb system seemed to conform to that reproduced in Fig. 1, showing that copper is capable of holding approximately 9.0 per cent. antimony in alpha solid solution at temperatures below 650 deg. C. In the light of more recent research conducted in Japan by Shibata† it has been suggested that the solubility of antimony in the alpha phase decreases gradually from 10.4 per cent. at 645 deg. C. to 7.6 per cent. at 488 deg. C., to 6.2 per cent. at 400 deg. C. and to 4.7 per cent. at room temperature as illustrated in Fig. 2. Table I shows the characteristics of the various phases in this system put forward by the above investigator. It should be noted that all the above experiments were conducted on specimens practically free from oxide.

In 1941 the Japanese* gave attention to the copper-antimony-nickel system and for convenience in reference the sections of the equilibrium diagram at the 1. per cent. and 2.5 per cent. nickel levels are reproduced in Figs. 3 and 4.

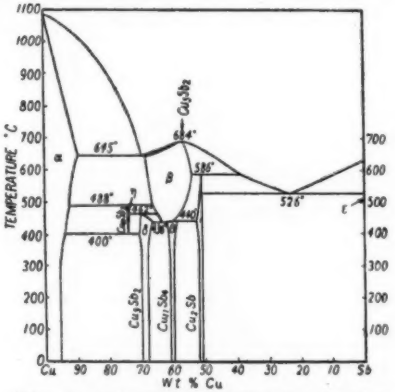



FIG. 1.—EQUILIBRIUM DIAGRAM OF THE CU-SB SYSTEM (HANSEN).

Apart from the above the only other work which appears to have been done on copper-antimony alloys is an investigation of their resistance to sulphuric acid published in Russia by Pershke and Vasyutovich.† In this research the chemical stability of antimony bronzes intended for replacing tin-bronze was investigated. Solid solution alloys containing 4.0 to 5.0 per cent. antimony were prepared and they were found to be only slightly less resistant to sulphuric acid attack than aluminium and tin bronzes.

So far no information has been published on the founding characteristics of this group of alloys and

* FOUNDRY TRADE JOURNAL, 1942, LXVIII, 395.

† Shibata, N. Nippon Kinzoku Gakkai-Si, 1938, II, No. 3, 108-118; Abs. in Jnl. Inst. Metals, Met. Abs., 1938, V, 476. Nippon Kinzoku Gakkai-Si, 1940, IV, No. 9, 269-289; Abs. in Jnl. Inst. Metals, Met. Abs., 1941, VIII, 81.

* Shibata, N. Nippon Kinzoku Gakkai-Si, 1941, V, No. 1, 12-25; Abs. in Jnl. Inst. Metals, Met. Abs., 1941, VIII, 221.

† Pershke, V. K. and Vasyutovich, S. F. Trudy Moskov. Inst. Khim. Mashinostroeniya, 1939, No. 7, 109-112; Abs. in Jnl. Inst. Metals, Met. Abs., 1943, X, 14.

## Report on Cu-Sb-Ni Gear Alloy

as a first step the Sub-Committee thought it desirable to obtain some idea as to how the alloys would behave in production. Practical tests were undertaken by Mr. J. Arnott, Mr. G. T. Hyslop, Mr. E. J. L. Howard and Mr. F. Hudson on copper containing 7.0 to 8.0 per cent. antimony with and without nickel, and the results from these investigations form the main basis of this report. Generally speaking, it was found that the alloys appear to have good founding properties when correctly melted and poured. Some gas unsoundness in sand castings has been encountered by several investigators, due either to dissolved gases or, more probably, to reaction with the mould surfaces used, but this can be avoided by proper technique. Above 1,100 deg. C. the metal is very fluid and runs readily and should present little difficulty in casting thin sections. Suitable casting temperatures seem to

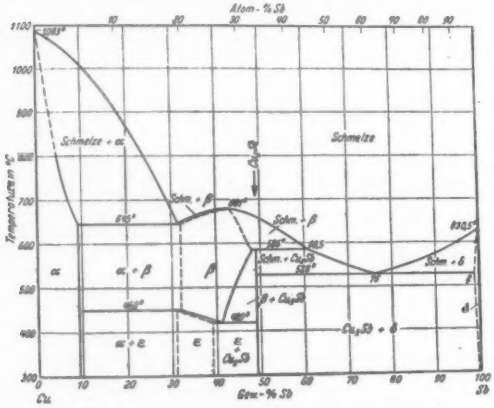



FIG. 2.—EQUILIBRIUM DIAGRAM OF THE CU-SB SYSTEM (SHIBATA).

lie between 1,100 deg. C. and 1,200 deg. C., according to the section and type of casting and there is nothing to indicate in these preliminary tests that methods of moulding and running need be any different from those adopted for normal tin bronzes.

In connection with the alloy containing 7.0 to 8.0 per cent. antimony, 1.5 to 2.5 per cent. nickel, balance copper, recommended by the Hamilton Gear & Machine Company, some difficulty has been found in obtaining an average tensile strength of 14.2 tons per sq. in. from sand castings, but by the use of chills considerably higher values than the quoted figures can be obtained with the composition specified and when modified by the addition of 0.5 to 1.0 per cent. of zinc. Accordingly the use of chills or centrifugal casting might be suggested as preferable methods for production. Chilling does not effect much improvement when there is no nickel present, and in both sand cast and chilled conditions the properties of the nickel-free alloy are much inferior to those obtained on the nickel-containing alloy.

An interesting point brought to light in this report is the fact that the copper-antimony-nickel alloy can be hardened appreciably by low-temperature heat-treatment.

Service tests on gear castings made in the copper-antimony-nickel alloy are under way and it is hoped that the results of these will be available when this report comes up for discussion. The Sub-Committee also consider that it will be necessary to determine the corrosion resistance of this alloy in the more common environments. Until such tests have been carried out the alloy is not one which would serve as a general substitute for tin bronze, although it may

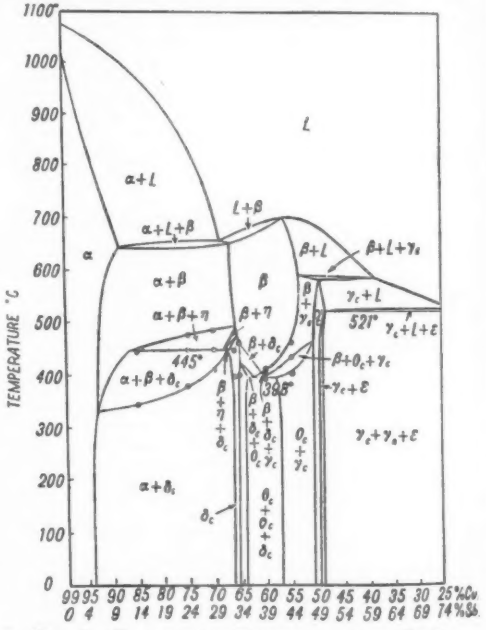



FIG. 3.—EQUILIBRIUM DIAGRAM OF THE CU-SB-NI SYSTEM. SECTION AT 1 PER CENT. NICKEL LEVEL (SHIBATA).

be quite suitable for certain types of gears and bearing surfaces.

In regard to the scrap problem, phosphor bronze and gunmetal are not particularly sensitive to contamination by antimony and a slight admixture with the copper-antimony-nickel alloy is not likely to be of serious moment with those materials. On the other hand, brasses and managanese bronzes are adversely affected by quite small amounts of antimony; very

careful segregation would therefore be called for if the new alloy were to be introduced into a foundry or machine shop handling brasses and manganese bronzes.

The report concludes with an appendix giving suggested methods for analysing the type of alloys under review prepared by Mr. R. Woollen and Mr. J. McPheat.

## COPPER-ANTIMONY-NICKEL ALLOY

By J. Arnott* (Member)

Two melts were made of the composition: Copper, 90.0 per cent.; nickel, 2.0 per cent.; antimony, 8.0 per cent. The nickel was introduced as 30 per cent. cupro-nickel scrap and the first melt was made without any special care during the melting operation. The heads on the castings did not exhibit the normal amount of shrinkage, hence only a few tests were made and it was decided to repeat the melt.

The data obtained from the first melt were as follows:— Contraction, 0.155 in. per ft. *Tensile Tests*:— (A) *Vertical Dry-sand Bar*: Tensile strength, 10.2 tons per sq. in.; elongation, 4 per cent.; Brinell, 72.4. (B) *Horizontal Chill Bar*: Tensile strength, 14.4 tons per sq. in.; elongation, 7 per cent.; Brinell, 75.3. The density of a dry-sand test-bar cast from this melt was 8.45.

In the second melt more care was taken with the melting operation. The copper and cupro-nickel were melted down with 2 per cent. of copper-oxide, and the metal deoxidised with phosphor-copper before adding the antimony. All the test-bar castings showed shrinkage in the heads similar to ordinary gunmetal. The density of a dry-sand test-bar from this melt was found to be 8.60.

The contraction found was 0.161 in. per ft., which compares with figures of 0.165 in. to 0.175 in. per ft. on A.G.M. The following test figures were obtained:

| | Tensile strength. Tons per sq. in. | Elongation. Per cent. | Brinell (1,000kg.) |
|---|---|---|---|
| Vertical dry sand, as cast .. | 10.4 | 3 | 90 |
| Vertical dry sand, annealed to 750 °C., ½ hr. .. .. | 13.0 | 5 | 85 |
| I.B.F. shaped bar, 0.564 in. | 11.6 | 3 | — |
| I.B.F. shaped bar, 0.798 in. | 8.2 | 3 | — |
| Chill .. .. .. .. | 14.4 | 3 | 94 |
| Chill annealed, 750° C., ½ hr. | 14.4 | 3 | 92 |

Two Izod test-pieces were machined from vertical test-bars. Two notches were cut in each and they were arranged to be cut on opposite sides of the test-pieces. The figures all came within the range 4 to 7 ft.-lbs. For comparison it might be added that Admiralty gunmetal cast in a similar fashion gives figures between 7 and 10 ft.-lbs.

Several friction tests were carried out on a reciprocating motion machine which has been used for many years and which has been found to give useful information on problems relating to pump practice. In the first set of trials the antimony alloy was rubbed against a 0.5 per cent. carbon steel in the fully hardened condition (V.P.N. 740). The test was carried out in air, without lubrication, with a load of 50 lbs. per sq. in., at a speed of 160 ft. per minute and for a duration of 100,000 strokes. The antimony alloy showed a wear of 0.003 in., while Admiralty gunmetal under the same conditions showed a wear of 0.089 in.

With the antimony alloy the steel specimen was very slightly scored, whereas with the gunmetal a certain amount of tearing had occurred. No experience is available to allow the value of these tests to be judged in relation to gear applications where lubricant is present. In general, however, it has been found that these friction tests give a useful indication of the suitability of two metals to rub together.

The second set of tests was made under the conditions which apply to many parts of pumps. The antimony alloy, and for comparison, a specimen of leaded gunmetal, were rubbed against cast Monel metal in boiling water with a load of 200 lbs. per sq. in.

The test with the antimony alloy was stopped at 50,000 strokes, after which period the specimen had worn 0.156 in. Under the same conditions the leaded gunmetal after 200,000 strokes had worn 0.015 in. It is possibly unwise to compare the new alloy which is lead-free against leaded gunmetal because under the conditions of this test, it has been found that leaded alloys always show reduced wear as compared with lead-free.

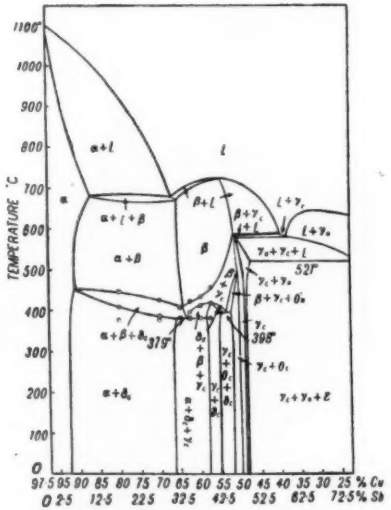



FIG. 4.—EQUILIBRIUM DIAGRAM OF THE CU-SB-NI SYSTEM. SECTION AT 2.5 PER CENT. NICKEL LEVEL (SHIBATA).

* Messrs. G. & J. Weir & Company, Limited.

## Report on Cu-Sb-Ni Gear Alloy

The various test-pieces referred to were made as follow:—

*Contraction, ¼ in. square, 12 in. long. Cast in Green Sand.*—The test-piece is cast against a metal yoke and the contraction afterwards measured by placing the casting inside the yoke and measuring with a taper scale. The *vertical bars* were the type commonly used for aluminium alloy tests, *i.e.*, 1 in. dia., with heads approximately 2¼ in. dia. They were cast in dry sand. The *chill test-pieces* were 1 in. dia., about 7 in. long,

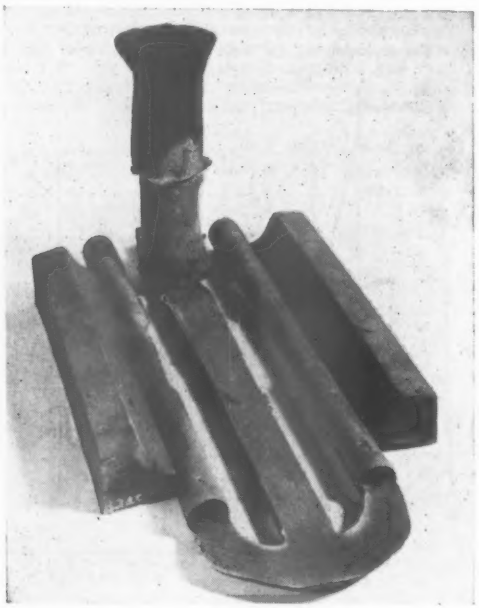


FIG. 5.—TYPE OF TEST-BAR USED BY BROWN AND HOWARD.

cast horizontally. The two sizes of I.B.F. shaped bars were made of the standard sizes and in dry sand. The friction test-pieces were cast in green sand.

## TIN-FREE GEAR BRONZE

BY W. BROWN (Member and E. J. L. HOWARD* (Member)

The effect of casting temperature on the physical properties of a sand-cast copper, antimony, nickel alloy has been determined. The nominal composition of the alloy used is:—Copper, 90.0 per cent.; antimony, 8.0 per cent.; nickel, 2.0 per cent. Two series of test-bars were made: "A" and "B."

*Series "A."*—Copper, antimony and nickel were alloyed in the proportion of copper 90 per cent., antimony 8 per cent. and nickel 2 per cent. The test-bars cast from it were made in green sand moulds. The copper was melted under a slag, and when completely molten the nickel added. The metal was brought up to 1,300 deg. C. under an oxidising atmosphere and then deoxidised with phosphor-copper. The antimony was then added and the temperature of the metal increased to 1,350 deg. C. before pouring into the ladle. A small quantity of phosphor-copper was again added before casting the test-bars.

*Series "B."*—The test-bars cast in this series were made in green-sand moulds and dry-sand moulds. The alloy was first prepared in the same manner as Series "A," and then cast into ingots. These were subsequently re-melted under an oxidising atmosphere and deoxidised with phosphor-copper prior to casting.

The metal for both series of tests was melted in a reverberatory furnace, 300 lbs. capacity, and fired with creosote-pitch. During the whole of the period of melting an oxidising atmosphere was maintained in the furnace. Previous experience had shown this alloy was prone to gas absorption, and this could best be prevented by the use of an oxidising atmosphere during melting.

The type of test-bar made is shown in Fig. 5. The

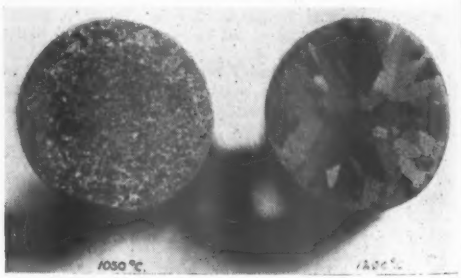



FIG. 6.—EFFECT OF CASTING TEMPERATURE ON MACROSTRUCTURE.

bars were cast two in a box moulded approximately to size. They are run with a down runner 1½ in. dia., terminating in a splay to both bars. The splay feeds the bars at the end, and the ingate is the same diameter as the bars. A dummy riser runs the length of and side of each bar. The sands used for making the moulds were those normally employed.

Six boxes of bars were cast for Series "A" and twelve for Series "B," and the pouring temperatures were 1,250, 1,200, 1,150, 1,100, 1,050, 1,000 deg. C. The metal was very fluid and ran easily, with the exception of the lowest temperature, when it was stiff. All the heads had a well-sunk appearance.

* Messrs. Mather & Platt, Limited.

### Physical and Other Tests

The physical tests carried out on the bars consisted of the determination of the ultimate tensile strength, yield point, elongation, Brinell hardness, Izod impact and density.

The bars were machined down to 0.564 in. diameter. The yield point was taken with a pair of dividers in the usual workshop manner. The Izod test-piece was the standard 10 mm. square bar with three notches, and the tests were carried out on a 120 ft. Avery machine. The hardness tests were taken with the Brinell machine, using a 10 mm. ball and a load of 500 kg. The results obtained on the bars are tabulated in Table II. The figures given are the average of two tests.

The fractures of test-bars cast from 1,100 deg. C. to 1,250 deg. C. inclusive were coarsely crystalline, while those cast at 1,050 deg. C. and 1,000 deg. C. were quite granular. The macroscopic appearance of the bars cast at high temperatures and those at low temperatures showed a marked difference, the grain size of the former being considerably larger than the latter. The macroscopic appearance of two bars cast at 1,200 deg. C. and 1,050 deg. C. respectively is shown in Fig. 6.

The casting temperature does not appear to influence the ultimate tensile strength, yield point, and elongation of the alloy to a very marked degree. The hardness and density rises with the fall in casting temperature. This is typical of most types of bronzes. The Izod figure is low and does not appear to be affected by casting temperature. The difference between the bars cast in green sand and those in dry sand is very little.

The physical properties of the alloy are lower than those usually employed for gears. For castings of similar section to the test-bars, probably the most suitable casting temperature is between 1,100 deg. C.

(*Continued on page* 183.)

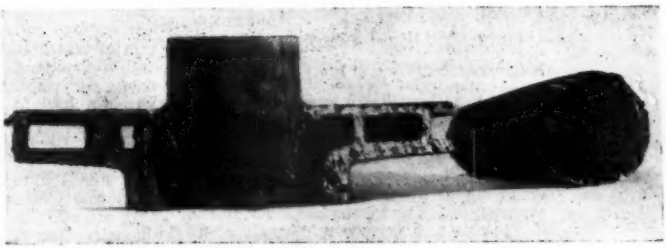


FIG. 7.—DEFECTS DUE TO GAS ABSORPTION.

TABLE II.—*Properties of Test Bars.*

| Casting temperature deg. C. | Ultimate tensile strength. Tons per sq. in. | Yield point. Tons per sq. in. | Elongation, per cent. | Brinell hardness. | Density | Izod ft./lbs. |
|---|---|---|---|---|---|---|
| | | Series "A." *Green Sand Test Bars.* | | | | |
| 1,250 | 11.5 | 9.6 | 4 | 69 | 8.58 | 3—5 |
| 1,200 | 12.2 | 9.8 | 5 | 69 | 8.53 | 3—5 |
| 1,150 | 14.2 | 10.1 | 11 | 76 | 8.59 | 3—5 |
| 1,100 | 12.7 | 9.04 | 4 | 80 | 8.58 | 3—5 |
| 1,050 | 12.7 | 10.7 | 4 | 86 | 8.67 | 2—4 |
| 1,000 | 9.6 | 8.6 | 1 | 86 | 8.66 | 1—2 |
| | | Series "B." *Green Sand Test Bars.* | | | | |
| 1,250 | 12.4 | 8.4 | 5 | 63 | 8.51 | 3—6 |
| 1,200 | 12.6 | 8.4 | 8 | 69 | 8.42 | 3—5 |
| 1,150 | 12.7 | 9.1 | 7 | 70 | 8.53 | 3—5 |
| 1,100 | 13.0 | 8.9 | 5 | 83 | 8.48 | 3—5 |
| 1,050 | 12.4 | 8.2 | 4 | 86 | 8.68 | 1—3 |
| 1,000 | 9.2 | 8.1 | 2 | 86 | 8.58 | 1—3 |
| | | Series "B." *Dry Sand Test Bars.* | | | | |
| 1,250 | 11.1 | 8.3 | 5 | 76 | 8.42 | 4—6 |
| 1,200 | 11.9 | 7.8 | 6 | 76 | 8.49 | 3—6 |
| 1,150 | 11.7 | 8.2 | 6 | 80 | 8.44 | 5—7 |
| 1,100 | 11.2 | 8.4 | 5 | 82 | 8.54 | 3—5 |
| 1,050 | 11.1 | 7.9 | 2 | 80 | 8.67 | 2—4 |
| 1,000 | 9.5 | 8.0 | 1 | 84 | 8.69 | 1—2 |

# ANNUAL REPORT OF THE INSTITUTE OF BRITISH FOUNDRYMEN

(*Concluded from page* 176.)

will probably be published in the near future. There is also in course of preparation an atlas of defective non-ferrous castings, which is to be presented to a number of Branches during the next session.

The Committee has been strengthened during the year by the nomination to the Sub-Committee of Mr. T. J. Peake, representing Superintendent, Technical Applications of Materials, Ministry of Supply, Mr. A. H. Waterfield, R.D.Mat., Ministry of Aircraft Production, and Mr. C. Coldron Smith, representing Engineer-in-Chief, Admiralty, and by the co-option of Mr. G. T. Hyslop. Dr. L. B. Hunt has resigned his convenership of the Sub-Committee and was succeeded by Mr. F. Hudson.

*Mechanical Development Sub-Committee.*—Meetings of the Sub-Committee, which was appointed in May, 1942, have been held monthly since June, 1942, and the ground work of the Sub-Committee's proposed comprehensive survey of mechanical handling methods has been almost completed. It is considered that the ultimate publication of this work will be of considerable value and particularly to students.

*Costing Sub-Committee.*—After some minor revisions had been made the "Recommendations for the Establishment of Costs in a Grey Iron Foundry," which the Costing Sub-Committee originally presented to the Annual Conference in 1937, was reprinted in cyclostyle form in order to satisfy the continued demand for this report.

*Melting Furnaces Sub-Committee.*—A number of meetings were held during the year, when the Sub-Committee prepared the section on melting furnaces for inclusion in the Technical Committee's report on fuel economy in foundries, referred to above. The report on "Melting Furnaces for Grey Cast Iron," prepared by the Sub-Committee and published to members of the Institute as Special Report No. 2, in January, 1940, was made generally available during 1942.

*Malleable Cast Iron Sub-Committee.*—The Sub-Committee's work on the proposed revisions to the B.S.I. 309 and 310 specifications is practically complete, but revision of the physical test requirements has been held over during the war period. In collaboration with the Sub-Committee the British Standards Institution issued amendments to the specifications in 1942, covering the clause regulating the provision of test-bars and the machinability clause.

Through the Sub-Committee the Institute was represented on a number of Sub-Committees of the Technical Advisory Panel to the Joint Directors for Iron Castings.

*Sands Sub-Committee.*—The Sub-Committee are working on testing procedure for oil sand, and the investigations on type of specimen and drying procedure are receiving attention at the moment. The possibility of using saw-dust or wood flour in moulds is being considered, and information on the practical application collected. The collection and classification of information on defects in castings is proceeding, and it is hoped to have information on this subject ready for publication at an early date. Mr. J. J. Sheehan had to resign his convenership of the Sub-Committee and was succeeded by Mr. A. Tipper.

### Silicosis and Fuel Economy

In addition to the work of the Sub-Committees the Technical Committee has also been giving considerable attention during the past year to the question of silicosis. The position has, however, become extremely complex, and in view of the commercial aspect of many of the questions involved the Technical Committee is not proceeding further in the matter, but passing on the information which it has collected to the appropriate trade organisations.

An account of many aspects of the advisory work which was carried out during 1941-42 on behalf of the Ministry of Supply and under the direction of Mr. J. W. Gardom, has been presented to the majority of Branches of the Institute by the Convener. It is anticipated that this Paper will be published and circulated to members during the coming year.

At the suggestion of the Ministry of Fuel the Technical Committee has prepared during the last three months a comprehensive report on fuel economy in foundries. For the purpose of preparing the report a special Committee was convened, representing all aspects of the industry, iron, malleable and non-ferrous, including the light alloys. At its first meeting, in February, the Committee arranged for the preparation of a first draft of the report, which was finalised at the second meeting, held in March. The report is shortly to be issued as Special Report No. 3 to all members of the Institute, and in order that the Committee's work may be of maximum value to the fuel efficiency campaign a copy of the report is being distributed to every foundry in the country. The recommendations contained in this report have been endorsed by the Ironfounding Industry Fuel Committee and the Technical Committees of the Association of Bronze and Brass Founders and the Light Metal Founders' Association, to whom the Committee wish to express their thanks.

The Association of Bronze and Brass Founders, established during the past year, has invited the Convener of the Non-Ferrous Sub-Committee (Mr. F. Hudson) to represent the Institute on their Technical Committee.

In response to a request from the Ministry of Fuel and Power, the Council of Ironfoundry Associations, with the co-operation of the B.C.I.R.A. and the I.B.F., has formed during the past year the Ironfounding Industry Fuel Committee. Mr. Gardom, Mr. Russell and Mr. Peace, as the Institute's representatives to the Technical Committee of the Council, serve on the Fuel Committee. Through the Committee the Institute continues to be well represented on a large number of B.S.I. Committees.

The Report is signed by Mr. J. W. Gardom, Convener.

## NEW PATENTS

*The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.*

552,834 STEWARTS AND LLOYDS, LIMITED, and HENDRY, D. C. Tilting mechanisms for Bessemer and like converters.

552,855 BRACKETT, F. M. Jogging machines for arranging sheets in piles.

552,972 FAIRWEATHER, H. G. C. (National Smelting Company). Aluminium base alloys.

552,978 STEVENS, A. H. (Electro Manganese Corporation). Cathodes for the electrolytic deposition of manganese thereon, and methods of making such cathodes.

552,982 CARNEGIE-ILLINOIS STEEL CORPORATION. Method of electroplating with tin and alloys thereof.

552,990 BRITISH CAST IRON RESEARCH ASSOCIATION, MORGAN, E., and HINCHLIFFE, E. Manufacture of cast iron.

552,993 HIGH DUTY ALLOYS, LIMITED, and HERON, J. A. Apparatus for testing fatigue of constructional materials.

## REPORT ON COPPER-ANTIMONY-NICKEL GEAR ALLOY

(*Continued from page* 181.)

and 1,200 deg. C. This naturally varies with the section and type of casting. The alloy appears to have good founding properties when correctly melted. Above 1,100 deg. C. the metal is very fluid, and runs readily, and should present little difficulty in casting thin sections.

TABLE III.—*Analyses of Test Bars.*

| | Series "A." | Series "B." |
|---|---|---|
| | Per cent. | Per cent. |
| Copper .. .. .. .. | 89.79 | 89.96 |
| Antimony .. .. .. | 8.13 | 7.95 |
| Nickel .. .. .. .. | 1.90 | 1.86 |
| Lead .. .. .. .. | 0.06 | 0.09 |
| Phosphorus .. .. .. | 0.01 | 0.01 |

It seems prone to gas absorption, which may result in numerous gas holes just below the casting surface. These defects are not revealed until the casting has been machined. Fig. 7 illustrates this fault. It may be overcome by melting under a fairly strong oxidising atmosphere and reducing with phosphor-copper. The casting temperature should not be too low. A number of small castings have been successfully made with this alloy, and there is nothing to indicate that the methods of moulding and running need be any different from those adopted for normal tin bronzes.

(*To be continued.*)

## WAR CHANGES IN ENGINEERING

Addressing the annual conference of the national committee of the Amalgamated Engineering Union at Southport last week, Mr. Jack Tanner, the president, said that two fundamental developments in engineering since the start of the war had been the breaking down of processes and the many new raw materials and methods of treating them. Plastics had come to stay. The new light and powdered metals and the up-grading of lower-quality materials in industry were not all wartime expedients. They would remain an integral part of engineering products. The sub-dividing of operations, the new types of jigging and sub-assembly developed during the war could not fail to leave their mark on future methods of production. These features, Mr. Tanner said, meant a move away from purely craft skill. It was not the union's business to regret this. It was their business to take note of it and devise policies in accordance with it.

The conference of the A.E.U. had before it also a resolution calling for a national minimum basic wage of £5 10s. 6d. It was resisted by the executive and defeated. A proposal on the agenda for an increase of 11s. a week and many other resolutions on wages were also rejected. The conference finally instructed the executive to approach the engineering employers for consolidation of the 33s. 6d. weekly bonus into wages, the establishment of unspecified national minimum rates, the executive being empowered to get the best they can, and application of the recent increase of 6s. a week to all timeworkers, a complaint having been that few workers benefited from this award. The executive is also to seek equal rates for women. The president pointed out that they could not go to the employers with these claims immediately after the conference. The other engineering unions must be consulted.

## BARROW HÆMATITE STEEL CO.

The accounts of the Barrow Hæmatite Steel Company, Limited, for 1942 show a profit of £115,067 (see "Company News," page 186).

During the year the company sold to the Ministry of Supply its steel and hoop works for £640,000. The amount received for the capital assets has been written off land and buildings account. In order that shareholders can appreciate what would have been the position of the company had the cash been received before the end of December last, a "pro forma" balance sheet has been prepared showing the effect of the sale after paying off debenture stock and other loans.

Liabilities are shown at £1,432,469, made up of share capital £707,250, general reserve £300,000, creditors and reserves £281,728, and profit and loss balance £143,491. On the assets side land, buildings and plant are shown at £630,309 and investments at £64,741, making a total of £695,050 of fixed assets. Current assets are £737,419, made up of £67,746 stock in trade, £638,989 sundry debtors and accrued amounts, and £30,684 cash at bank.

## NEWS IN BRIEF

HARGRAVES BROS., foundry and engineers' specialists, announce that the address of their head office is now 31, Quay Street, Manchester, 3 (telephone: Blackfriars 9510).

BRITAIN'S OUTPUT OF MUNITIONS of war in the first quarter of 1943 exceeded by 40 per cent. the output of the first quarter of 1942, Mr. Oliver Lyttelton (Minister of Production) stated last week.

REFERRING at the annual meeting of Derbyshire Stone, Limited, to the mining and refining of fluorspar, an activity only developed by the company since the commencement of the war, the chairman (Mr. S. D. Clements) said that they were now one of the three largest producers of this important mineral.

AT THE MEETING last week of David Brown & Sons (Huddersfield), Limited, proposals were adopted for the settlement of differences between members of the board, and the directors were re-elected. The chairman, Sir Ernest Roney, stated that the company and its subsidiaries were fully engaged on national work.

THE GRINDING, SCREENING AND FILTERING DIVISION of International Combustion, Limited, report that among orders recently received by them is one for six Junior Hummer screens for screening aluminium alloy at 100 mesh separation, and one for a Hummer screen to screen approximately 13 tons per hour of damp fullers' earth.

A NEW SCHEME which is being promoted by the Directorate of Salvage and Recovery, Ministry of Supply, aims at the appointment by each industrial works of a Salvage Officer, who may be either part-time or whole-time, to stimulate and organise the maximum recovery of salvage in each works or department of the works. Leaflets for the guidance of such Salvage Officers are provided by the Ministry and, if desired, a limited number of posters will also be supplied.

## BRITISH EMPLOYERS' FEDERATION

The British Employers' Confederation, at its annual meeting last week, considered a recommendation to broaden the constitution to enable it to deal with economic factors affecting industry as well as the labour factors to which it is at present restricted. Some months ago the Confederation opened negotiations for a fusion with the Federation of British Industries. The proposal for widening the powers of the Confederation is the outcome of a refusal by the F.B.I., which has hitherto spoken for British employers on economic questions, to the proposed creation of an organisation qualified to speak on both labour and economic questions. The F.B.I. also held its annual meeting last week. The Grand Council, in its report, referred to the Confederation's proposal to broaden its constitution, and intimated that when this had been done the prospects of agreement in the negotiations would be improved.

## OBITUARY

MR. WILLIAM STORR, secretary of the Hallamshire Steel & File Company, Limited, died in Sheffield recently.

MR. WALTER FURNESS, chairman of the Furness Shipbuilding Company, Limited, Haverton Hill-on-Tees, died at Harrogate on June 20.

MR. JAMES TINCH, for 50 years works manager of Cockburns, Limited, engineers and founders, Cardonald, died in Glasgow on June 20.

MR. JOHN A. HUNTON, a director and general works manager of Ashmore, Benson, Pease & Company, Limited, Stockton-on-Tees, died on June 23, aged 58.

MR. SAM MAVOR, chairman of Mavor & Coulson, Limited, engineers, makers of conveyors, elevators, underground coal-cutters, etc., Bridgeton, Glasgow, S.E., has died at the age of 80.

MR. WILLIAM EDWIN SYKES, chairman and managing director of W. E. Sykes, Limited, manufacturers of gear-cutting and measuring instruments, of Staines, Middlesex, died recently, aged 59.

MR. ANDREW R. DEANS, who has died at West Hartlepool as the result of an accident, was for 22 years with Edmunds, Walker & Company, Limited, makers of steel balls and bearings, Hendon, London, N.W.9. He was serving in the R.A.O.C. at the time of his death.

MR. LESLIE BRADFORD, general manager of the Broken Hill Proprietary Company, Limited, has died, aged 65. He joined the Broken Hill Company as a chemist and metallurgist in 1914, left six years later to establish the Bradford Kendall Steel Foundry at Sydney, and rejoined the company in 1923.

## PERSONAL

MR. S. COX, tool room foreman of Newman, Hender & Company, Limited, manufacturers of brass, gunmetal and iron valves, water fittings, etc., of Woodchester, Glos., has been awarded the British Empire Medal.

MR. DENNIS E. WISEMAN has been appointed general manager with MR. W. P. KEMP of Short & Harland, Limited. Mr. Wiseman has also been appointed a director of the company. MR. J. A. POLLIN is appointed assistant general manager.

FLIGHT-LIEUT. GEORGE KENNING has been awarded the D.F.C. for being "throughout his period of service an inspiration to all pilots in his squadron." He is the third son of Sir George Kenning, chairman and managing director of Kennings, Limited, motor and agricultural engineers, of Sheffield and Chesterfield, and is himself secretary of the firm. Before joining the R.A.F. he was a second lieutenant in the 40th Sherwood Foresters A.A. Battalion, R.E., Territorial Army. He was commissioned in the R.A.F. in 1940. Flight-Lieut. Kenning is 26 years of age and is one of three brothers serving in the Forces.

# STANTON DALE

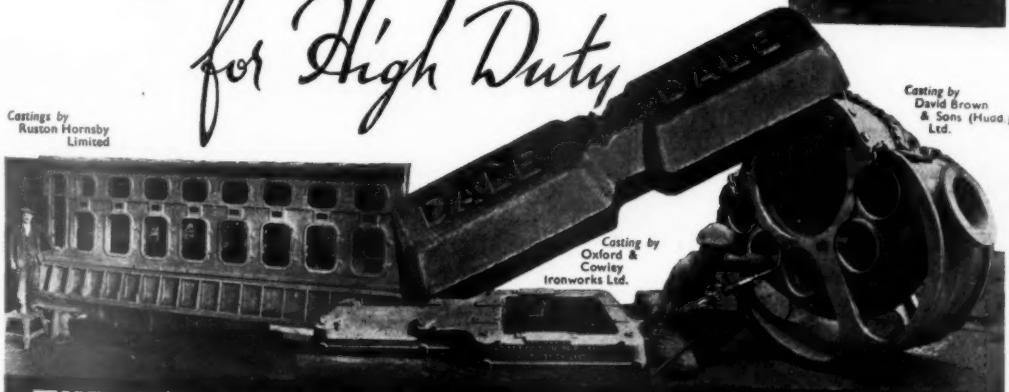
## *Refined* PIG IRON

*for High Duty*

Castings by Morris Motors Limited.

Casting by Baker Perkins Limited

Castings by Ruston Hornsby Limited




Castings by Ruston Hornsby Limited

Casting by David Brown & Sons (Huad.) Ltd.

Casting by Oxford & Cowley Ironworks Ltd.

THE STANTON IRONWORKS COMPANY LIMITED
NEAR NOTTINGHAM.

## COMPANY NEWS

*(Figures for previous year in brackets.)*

**Glacier Metal**—Dividend of 7½% (same).

**R. B. Pullin & Company**—Interim dividend of 5% (same).

**Incandescent Heat**—Net profit for 1942, £7,314 (£7,155).

**Electric Furnace**—Final dividend of 4½%, making 8% (same).

**Banister Walton**—Final dividend of 15%, making 20% (same).

**Amalgamated Metal**—Dividend on the ordinary shares of 3½% (same).

**Herbert Terry & Sons**—Net profit, £35,089 (£37,183); dividend of 30% (same).

**W. & T. Avery**—Final dividend on the ordinary shares of 10%, making 15%.

**Climax Rock Drill & Engineering Works**—Final dividend of 7½%, making 12½% (same).

**Hodbarrow Mining**—Profit for year to March 27 last, £12,357 (£12,172); dividend of 5% (same).

**John Hetherington (Holdings)**—Net profit to March 31 last, £2,172 (£2,227); debit forward, £136,668 (£138,840).

**Jury Holloware (Stevens)**—Net profit, after tax, for the year to March 31 last, £30,516 (£30,856); to depreciation account, £6,000 (same); dividend of 10% (same); forward, £17,363 (£15,847).

**John Harper & Company**—Profit for the year ended March 28, £109,326 (£68,577); taxation, £80,481; net profit, £28,095 (£27,476); dividend of 15% (same) on the ordinary shares; forward, £20,624 (£10,739).

**Johnson Matthey**—Net profit to March 31, after £200,000 to tax reserve, debenture interest, etc., £166,280 (£54,387); final ordinary dividend of 7%, making 10% (same); forward, £275,027 (£254,747).

**Tredegar Iron & Coal**—Profit for the year to March 31, 1943, £61,145 (£61,577); to general reserve, £50,000 (nil); to depreciation, £15,000 (same); dividend on "A" and "B" shares of 4% (same); forward, £38,437 (£76,913).

**Barrow Hæmatite Steel**—Profit for 1942, after payment of interest charges and writing off depreciation of fixed assets, £115,067; to general reserve, £100,000; dividend on the ordinary shares of 5% (nil); forward, £25,809 (£28,424).

**Butterley Company**—Second interim dividend of 8½% on the ordinary stock in respect of the year ended March 31, 1943. A first interim of 3½% was paid in December, and as no further dividend distribution will be recommended for this period, the total is 12% (against 10%).

**London Electric Wire Company & Smiths**—Net profit for 1942, after taxation, £100,358 (£89,581); investment reserve no longer required, £50,000 (nil); establishment of a superannuation scheme, £50,000; final ordinary dividend of 5½%, making 7½% (same); forward, £128,258 (£110,234).

**William Denny & Bros.**—Trading profit for 1942, after depreciation, contingencies and taxation, £80,926 (£84,117); war damage contribution, £4,750; to general reserve, £35,000; preference dividend (gross), £15,000; dividend of 10% (same) on the ordinary shares, £25,000; forward, £14,383 (£13,207).

**Park Gate Iron & Steel**—Trading profit for the year to March 31 last, £252,252 (£243,529); depreciation, £60,000; reserved for taxation, £105,000; debenture interest and sinking fund, £28,000; net profit, £59,252 (£54,785); dividend of 4% (same), £40,000; to reserve, £20,000; forward, £47,008 (£47,756).

**Ambrose Shardlow & Company**—Profit for the year ending March 31, after income-tax and E.P.T., £35,656 (£34,645); reserved for exceptional depreciation, £20,000; dividend on the 7½% cumulative preference shares, £13,125; dividend of 7½% (same) on the ordinary shares; forward, £17,209 (£27,803).

**John Thompson Engineering**—Trading profit for 1942, £71,162 (£116,184); dividends from subsidiaries, £67,531 (£67,268), making £138,693 (£183,542); tax, £19,000 (£62,000); depreciation, £11,011 (£11,772); staff pension scheme, £6,409; profit on sale of investments, £214 (£13,577); from investments reserve, £5,000; ordinary distribution, including a bonus of 5%, 22½% (same), £50,798; preference dividend, £11,778 (same); to general reserve, £30,000 (£20,000);; to dividend reserve, £10,000 (£20,000); to employees' pension fund, £5,000 (£10,000); forward, £52,937 (£53,676).

## NEW COMPANIES

*("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)*

**Greenwoods' Bolt Manufacturers,** Walk Mills, Keighley—£1,000.

**F. E. Garbett,** 67, Temple Street, Wolverhampton—Engineers. £1,000. F. E. and A. G. Garbett.

**Bridgefield Engineering Company (Leeds),** 54-56, Whitehall Road, Leeds—£1,000. G. H. and E. Cranfield.

**Robec Tool & Engineering Company,** 19, Stirling Chambers, Campo Lane, Sheffield—£5,000. R. and A. Beckett.

**Hayter, Watts & Company,** 25, Buckingham Gate, London, S.W.1—Engineers, manufacturers of combustion apparatus, etc. £5,000.

**F. M. Iillich Gears,** 78, Old Broad Street, London, E.C.2—Engineers, gear cutters, etc. £3,000. Lillian D. Iillich, J. T. May, A. A. and E. H. Turner.

**Bi-Metals (Britonol),** St. Mary's Works, Abbey Estate, Alperton, Mdx.—Dealers of and workers in metals, alloys, mineral compounds, etc. £5,000.

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MR. J. L. RIDGWELL, who has joined the sales staff of the Fordath Engineering Company, Limited, Hamblet Works, West Bromwich, has for the last 24 years been a member of the technical staff of the South Wales branch of Baldwins, Limited. In 1927 he was appointed chief chemist and metallurgist to Messrs. Baldwins' iron, steel, engineering and silica brick works at Landore, Swansea, and later to the Elba Steel Works, Gowerton. In recent times he was melting shop superintendent at one of the Swansea works.

MINISTRY OF SUPPLY

# RUBBER IS SCARCE

# YET..

only 35% of the tyres now recovered are fit for re-treading. The remaining 65% are only fit for scrap: because they have been ruined either by neglect or abuse or by having been run too far.

## REMEMBER

Under The Motor Vehicles (Restriction of Use) (No. 2) Order 1942, it is now a punishable offence to run tyres with the fabric showing.

## SUBMIT TYRES FOR REPLACEMENT WHEN SMOOTH

# Raw Material Markets

## IRON AND STEEL

In most departments of the iron and steel trade there is a ready demand for all outputs. In the steel section, particularly, requirements fluctuate according to the needs of the war effort, and makers have displayed commendable adaptability in adjusting their productions to satisfy the demand for a wide range of materials. Heavy-engineering and machine-tool foundries, together with a number of jobbing foundries, are operating to capacity and, in the aggregate, the demand for pig-iron is considerable; in fact, the foundries cannot get anything like all the medium- and low-phosphorus iron and hematite they would like, as production of these descriptions has been affected by the difficulty of importing the ores required for their manufacture. To meet the deficiency in the higher-grade irons, however, adequate supplies of high-phosphorus iron, steel scrap, etc., have been forthcoming and, generally speaking, the position might have been much less satisfactory. There is justification for the hope that imports of ore needed for the production of the better grades of iron will gradually improve now that the Allied outlook in the Mediterranean zone is so much happier, but it will inevitably be a long time before shipment of these irons approaches normality. Basic pig-iron for the steelworks is in satisfactory supply.

Activity among many of the light-castings foundries is very much better, but the trade as a whole could do with additional employment, as it is still feeling the absence of large-scale orders from the building industry. Many foundries in this branch have been able to alter their productions to meet the needs of Government departments; on the whole, there is little demand from official quarters for light castings of the kinds on which these foundries were accustomed to specialise.

Supplies of foundry coke continue to be fully enough to meet the demand. Current needs are being satisfied promptly, while users with the necessary accommodation are augmenting their stocks against winter requirements.

Steel-plate mills are heavily committed over a considerable period ahead, and there is every prospect of large orders being placed in this trade for a long time to come, as plates are being widely used in the industries catering for the production of war materials. Shipyards, wagon and boiler makers, and many other heavy industrial undertakings are requisitioning huge tonnages and their needs are granted first priority. Sheet makers are also busily engaged, while producers of special and alloy grades of steel have their outputs booked well ahead.

## NON-FERROUS METALS

The Controlled Materials Plan comes into operation in the United States as from the beginning of this month. It has been operating provisionally for some time past and it is believed that it has been successful in its main aim, which is to keep requisitioned tin to the level of available supplies of new metal. In the early stages of the working of the Plan, allocations have been on a rather conservative scale, and it is likely that allocations will be rather more liberal in future. According to one report, allocations of copper products over the third quarter total over a million tons. In order to provide additional quantities of copper for the manufacturers of vital war products, the U.S. War Production Board has added numerous building items to the restricted list.

Supplies of spelter in the United Kingdom have eased considerably of late, due to a fall in the demand from makers of certain munitions, production of which has declined. Nevertheless, the Control authorities are not permitting relaxations in usage of the metal and non-essential consumers continue to receive very little. American output of refined lead from domestic and secondary foreign material in May increased moderately.

## NEW TRADE MARKS

*The following applications to register trade marks appear in the "Trade Marks Journal":—*

"KUMANAL"—Metal alloys. I.C.I. METALS, LIMITED, Wexham Road, Slough, Bucks.

"STENOR"—Non-precious metals, hand tools, etc. STENOR, LIMITED, 37, Kew Foot Road, Richmond, Surrey.

"OPPERMAN"—Tractors, etc. S. E. OPPERMAN, LIMITED, North Circular Road, Stonebridge Park, London, N.W.10.

"VISCOL"—Electric soldering irons and electric tinning pots. THOMAS LEEMAN, 34, Palmerston Road, South Acton, London, W.3.

"DURACLAD"—Insulated electric conductors, wire and cables. DURATUBE & WIRE, LIMITED, 16, Hanworth Road, Feltham, Middx.

"ACE"—Machine tools, electric motors, and machine couplings. WILLIAM URQUHART, 1023-1027, Garratt Lane, London, S.W.17.

"PETTER"—Internal combustion engines, electric generators, etc. BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED, Falcon Works, Nottingham Road, Loughborough.

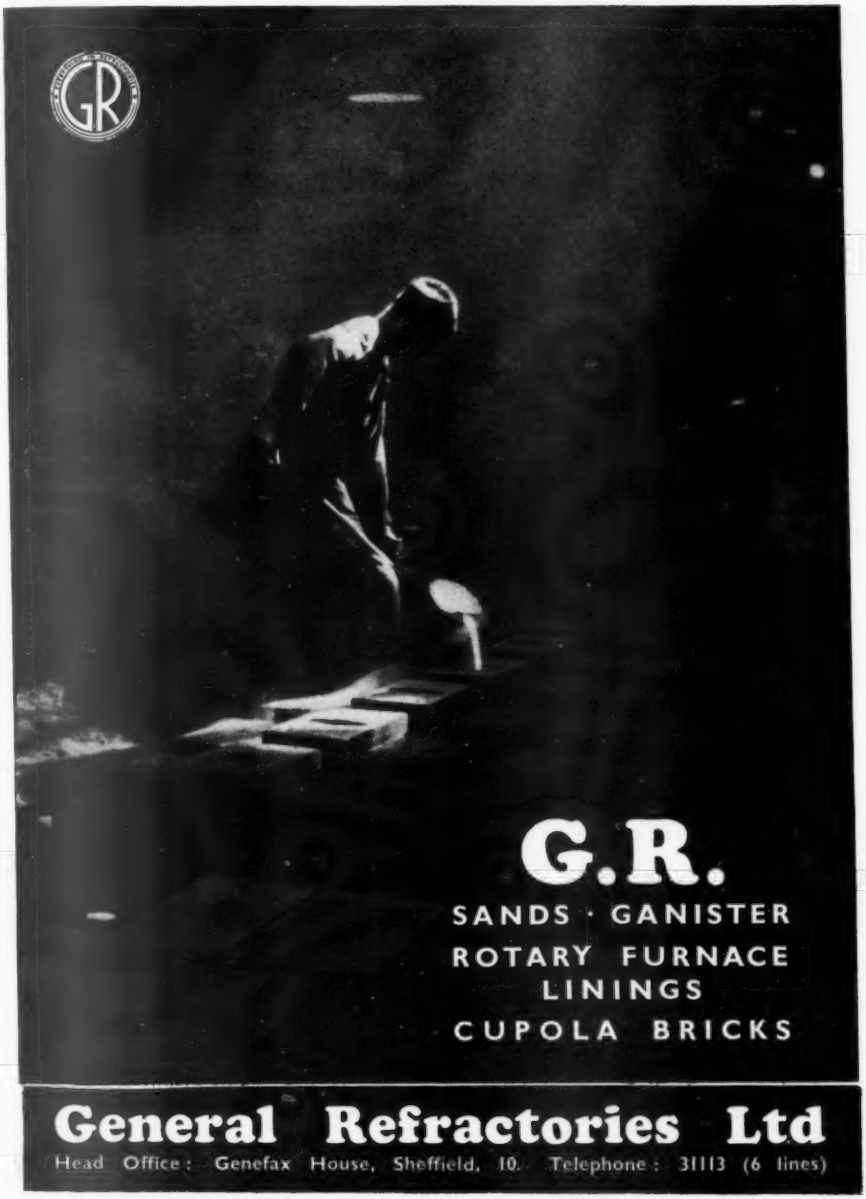
"TEWEL"—Parts of stationary motors and of internal combustion engines, etc. WHITESIDES (CLITHEROE), LIMITED, Empire Buildings, Parson Lane, Clitheroe, Lancs.

"OXYPLANE"—Machines for thermo-chemically conditioning the surfaces of metal bodies and for dividing metals by fusion methods. BRITISH OXYGEN COMPANY, LIMITED, Grosvenor House, Park Lane, London, W.1.

*[Applications to the Cutlers' Company, Sheffield.]*

"MOREX"—Steel. DARWINS, LIMITED, Fitzwilliam Works, Templeborough, Sheffield.

"ULTRACAPITAL"—Hand tools. ARTHUR BALFOUR & COMPANY, LIMITED, Capital Steel Works, Willey Street, Sheffield.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# CURRENT PRICES OF IRON, STEEL AND NON-FERROUS METALS

*(Delivered, unless otherwise stated)*

Wednesday, June 23, 1943

## PIG-IRON

**Foundry Iron.**—CLEVELAND No. 3: Middlesbrough, 128s.; Birmingham, 130s.; Falkirk, 128s.; Glasgow, 131s.; Manchester, 133s. DERBYSHIRE No. 3: Birmingham, 130s.; Manchester, 133s.; Sheffield, 127s. 6d. NORTHANTS No. 3: Birmingham, 127s. 6d.; Manchester, 131s. 6d. STAFFS No. 3: Birmingham, 130s.; Manchester, 133s. LINCOLNSHIRE No. 3: Sheffield, 127s. 6d.; Birmingham, 130s.

(*No. 1 foundry 3s. above No. 3. No. 4 forge 1s. below No. 3 for foundries, 3s. below for ironworks.*)

**Hematite.**—No. 1 (S & P 0.03 to 0.05 per cent.): Scotland, N.-E. Coast and West Coast of England, 138s. 6d.; Sheffield, 144s.; Birmingham, 150s.; Wales (Welsh iron), 134s. East Coast No. 3 at Birmingham, 149s.

**Low-phosphorus Iron.**—Over 0.10 to 0.75 per cent. P, 140s. 6d., delivered Birmingham.

**Scotch Iron.**—No. 3 foundry, 124s. 9d.; No. 1 foundry 127s. 3d., d/d Grangemouth.

**Cylinder and Refined Irons.**—North Zone, 174s.; South Zone, 176s. 6d.

**Refined Malleable.**—North Zone, 184s.; South Zone, 186s. 6d.

**Cold Blast.**—South Staffs, 227s. 6d.

(NOTE.—*Prices of hematite pig-iron, and of foundry and forge iron with a phosphoric content of not less than 0.75 per cent., are subject to a rebate of 5s. per ton.*)

## FERRO-ALLOYS

*(Per ton unless otherwise stated, basis 2-ton lots, d/d Sheffield works.)*

**Ferro-silicon** (5-ton) lots.—25 per cent., £21 5s.; 45 per cent., £23 10s.; 75 per cent., £36 10s.

**Ferro-vanadium.**—35/50 per cent., 15s. 6d. per lb. of V.

**Ferro-molybdenum.**—70/75 per cent., carbon-free, 6s. per lb. of Mo.

**Ferro-titanium.**—20/25 per cent., carbon-free, 1s. 3½d. lb.

**Ferro-tungsten.**—80/85 per cent., 9s. 8d. lb.

**Tungsten Metal Powder.**—98/99 per cent., 9s. 9½d. lb.

**Ferro-chrome.**—4/6 per cent. C, £44; max. 2 per cent. C, 1s. 0½d. lb.; max. 1 per cent. C, 1s. 1½d. lb.; max. 0.5 per cent. C, 1s. 1½d. lb.

**Cobalt.**—98/99 per cent., 8s. 9d lb.

**Metallic Chromium.**—96/98 per cent., 4s. 5d. lb.

**Ferro-manganese.**—78/98 per cent., £18 10s.

**Metallic Manganese.**—94/96 per cent., carb.-free, 1s. 9d. lb.

## SEMI-FINISHED STEEL

**Re-rolling Billets, Blooms and Slabs.**—BASIC: Soft, u.t., 100-ton lots, £12 5s.; tested, up to 0.25 per cent. C, £12 10s.; hard (0.42 to 0.60 per cent. C), £13 17s. 6d.; silico-manganese, £17 5s.; free-cutting, £14 10s. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £15 15s.; case-hardening, £16 12s. 6d.; silico-manganese, £17 5s.

**Billets, Blooms and Slabs for Forging and Stamping.**—Basic, soft, up to 0.25 per cent. C, £13 17s. 6d.; basic hard, 0.42 to 0.60 per cent. C, £14 10s. 6d.; acid, up to 0.25 per cent. C, £16 5s.

**Sheet and Tinplate Bars.**—£12 2s. 6d., 6-ton lots.

## FINISHED STEEL

[*A rebate of 15s. per ton for steel bars, sections, plates, joists and hoops is obtainable in the home trade under certain conditions.*]

**Plates and Sections.**—Plates, ship (N.-E. Coast), £16 3s.; boiler plates (N.-E. Coast), £17 0s. 6d.; chequer plates (N.-E. Coast), £17 13s.; angles, over 4 un. ins., £15 8s.; tees, over 4 un. ins., £16 8s.; joists, 3 in. × 3 in. and up, £15 8s.

**Bars, Sheets, etc.**—Rounds and squares, 3 in. to 6½ in., £16 18s.; rounds, under 3 in. to ⅜ in. (untested), £17 12s.; flats, over 5 in. wide, £15 13s.; flats, 5 in. wide and under, £17 12s.; rails, heavy, f.o.t., £14 10s. 6d.; hoops, £18 7s.; black sheets, 24 g. (4-ton lots), £22 15s.; galvanised corrugated sheets (4-ton lots), £26 2s. 6d.; galvanised fencing wire, 8g. plain, £26 17s. 6d.

**Tinplates.**—I.C. cokes, 20 × 14 per box, 29s. 9d., f.o.t. makers' works, 30s. 9d., f.o.b.; C.W., 20×14, 27s. 9d., f.o.t., 28s. 6d., f.o.b.

## NON-FERROUS METALS

**Copper.**—Electrolytic, £62; high-grade fire-refined, £61 10s.; fire-refined of not less than 99.7 per cent., £61; ditto, 99.2 per cent., £60 10s.; black hot-rolled wire rods, £65 10s.

**Tin.**—99 to under 99.75 per cent., £275; 99.75 to under 99.9 per cent., £276 10s.; min. 99.9 per cent., £278 10s.

**Spelter.**—G.O.B. (foreign) (duty paid), £25 15s.; ditto (domestic), £26 10s.; "Prime Western," £26 10s.; refined and electrolytic, £27 5s.; not less than 99.99 per cent., £28 15s.

**Lead.**—Good soft pig-lead (foreign) (duty paid), £25; ditto (Empire and domestic), £25; English, £26 10s.

**Zinc Sheets, etc.**—Sheets, 10g. and thicker, x works, £37 12s. 6d.; rolled zinc (boiler plates), ex works, £ 5 12s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £30 10s.

**Other Metals.**—Aluminium, ingots, £110; antimony, English, 99 per cent., £120; quicksilver, ex warehouse, £68 10s. to £69 15s.; nickel, £190 to £195.

**Brass.**—Solid-drawn tubes, 14d. per lb.; brazed tubes, 16d.; rods, drawn, 11½d.; rods, extruded or rolled, 9d.; sheets to 10 w.g., 10½d.; wire, 10½d.; rolled metal, 10½d.; yellow metal rods, 9d.

**Copper Tubes, etc.**—Solid-drawn tubes, 15½d. per lb.; brazed tubes, 15½d.; wire, 10d.

**Phosphor Bronze.**—Strip, 13½d. per lb.; sheets to 10 w.g., 14½d.; wire, 16d.; rods, 16d.; tubes, 21½d.; castings, 19d., delivery 3 cwt. free. 10 per cent. phos. cop. £35 above B.S.; 15 per cent. phos. cop. £43 above B.S.; phosphor tin (5 per cent.) £40 above price of English ingots. (C. CLIFFORD & SON, LIMITED.)

**Nickel Silver, etc.**—Ingots for raising, 10d. to 1s. 4d. per lb.; rolled to 9 in. wide, 1s. 4d. to 1s. 10d.; to 12 in. wide, 1s. 4½d. to 1s. 10½d.; to 15 in. wide, 1s. 4½d. to 1s. 10½d.; to 18 in. wide, 1s. 5d. to 1s. 11d.; to 21 in. wide, 1s. 5½d. to 1s. 11½d.; to 25 in. wide, 1s. 6d. to 2s. Ingots for spoons and forks, 10d. to 1s. 6½d. Ingots rolled to spoon size, 1s. 1d. to 1s. 9½d. Wire round, to 10g., 1s. 7½d. to 2s. 2½d., with extras according to gauge. Special 5ths quality turning rods in straight lengths, 1s. 6½d. upwards.

## NON-FERROUS SCRAP

**Controlled Maximum Prices.**—Bright untinned copper wire, in crucible form or in hanks, £57 10s.; No. 1 copper wire, £57; No. 2 copper wire, £55 10s.; copper firebox plates, cut up, £57 10s.: clean untinned copper, cut up, £56 10s., braziery copper, £53 10s.; Q.F. process and shell-case brass, 70/30 quality, free from primers, £49; clean fired 303 S.A. cartridge cases, £47; 70/30 turnings, clean and baled, £43; brass swarf, clean, free from iron and commercially dry, £34 10s.; new brass rod ends, 60/40 quality, £38 10s.; hot stampings and fuse metal, 60/40 quality, £38 10s.; Admiralty gunmetal, 88-10-2, containing not more than ½ per cent. lead or 3 per cent. zinc, or less than 0½ per cent. tin, £74 10s., all per ton ex works.

**Returned Process Scrap.**—(Issued by the N.F.M.C. as the basis of settlement for returned process scrap, week ended June 25, where buyer and seller have not mutually agreed a price; net, per ton, ex-sellers' works, suitably packed):—

BRASS.—S.A.A. webbing, £48 10s.; S.A.A. defective cups and cases, £47 10s.; S.A.A. cut-offs and trimmings, £42 10s.; S.A.A. turnings (loose), £37; S.A.A. turnings (baled), £42 10s.; S.A.A. turnings (masticated), £42; Q.F. webbing, £49; defective Q.F. cups and cases, £49; Q.F. cut-offs, £47 10s.; Q.F. turnings, £38; other 70/30 process and manufacturing scrap, £46 10s.; process and manufacturing scrap containing over 62 per cent. and up to 68 per cent. Cu, £43 10s.; ditto, over 58 per cent. to 62 per cent. Cu, £38 10s.; 85/15 gilding metal webbing, £52 10s.; 85/15 gilding defective cups and envelopes before filling, £50 10s.; cap metal webbing, £54 10s.; 90/10 gilding webbing, £53 10s.; 90/10 gilding defective cups and envelopes before filling, £51 10s.

CUPRO NICKEL.—80/20 cupro-nickel webbing, £75 10s.; 80/20 defective cups and envelopes before filling, £70 10s.

NICKEL SILVER.—Process and manufacturing scrap: 10 per cent. nickel, £50; 15 per cent. nickel, £56; 18 per cent. nickel, £60; 20 per cent. nickel, £63.

COPPER.—Sheet cuttings and webbing, untinned, £54; shell-band plate scrap, £56 10s.; copper turnings, £48.

## IRON AND STEEL SCRAP

(*Delivered free to consumers' works. Plus* 3½ *per cent. dealers' remuneration. 50 tons and upwards over three months,* 2s. 6d. *extra.*)

**South Wales.**—Short heavy steel, not ex. 24-in. lengths, 82s. to 84s. 6d.; heavy machinery cast iron, 87s.; ordinary heavy cast iron, 82s.; cast-iron railway chairs, 87s.; medium cast iron, 78s. 3d.; light cast iron, 73s. 6d.

**Middlesbrough.**—Short heavy steel, 79s. 9d. to 82s. 3d. heavy machinery cast iron, 91s. 9d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 89s. 3d.; medium cast iron, 79s. 6d.; light cast iron, 74s. 6d.

**Birmingham District.**—Short heavy steel, 74s. 9d. to 77s. 3d.; heavy machinery cast iron, 92s. 3d.; ordinary heavy cast iron, 87s. 6d.; cast-iron railway chairs, 87s. 6d.; medium cast iron, 80s. 3d.; light cast iron, 75s. 3d.

**Scotland.**—Short heavy steel, 79s. 6d. to 82s.; heavy machinery cast iron, 94s. 3d.; ordinary heavy cast iron, 89s. 3d.; cast-iron railway chairs, 94s. 3d.; medium cast iron, 77s. 3d.; light cast iron, 72s. 3d.

(NOTE.—*For deliveries of cast-iron scrap free to consumers' works in Scotland, the above prices less* 3s. *per ton, but plus actual cost of transport or* 6s. *per ton, whichever is the less.*

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FOUNDRY MANAGER required to take charge of Foundry producing high class small Whiteheart specialised Castings; must be experienced in all stages of production up to the machine shop; permanent position, with excellent prospects; West Midland district; please state age, experience, and salary required. —Box 886, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

METALLURGIST (Male), exp. in chemical analysis of alloy cast irons and mechanical testing lab. work. To take charge in permanent night shift. £400 per annum or more according to qualifications.—Written applications to APPOINTMENTS OFFICER, Ministry of Labour and National Service, Britannia House, Broadway, Bradford.

REPRESENTATIVE (exempt), Midlands area; preferably some knowledge furnace construction; to sell foundry equipment. State age, experience.—Box 914, FOUNDRY TRADE JOURNAL, 3, Amersham Road, High Wycombe.

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SINGLE CYLINDER Horizontal Air Compressor, INGERSOLL RAND, Serial No. 61799, Class E.R.1, 12 in. by 8 in. Fitted with mechanical Lubricator and Flywheels, 4 ft. by 6 in. by 9 in., at 250 r.p.m.; 260 cub. ft. displacement, 35 lbs. pressure. — NEWMAN INDUSTRIES, LIMITED, Yate, Bristol.

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10-cwt. Morgan 200 and 80 lbs. oil-fired Tilting Furnaces.
Morgan Type "S" Oil-fired Tilting Furnace; 400-440 lbs. capacity.
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Jackman Foundry Sand Riddle.
Silksand Disintegrator.
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FOR SALE.—One Junior Motive Type Sandslinger; built by the Foundry Plant & Machinery, Limited; very little used; travelling type, with 7 tons sand bin with 12 ft. radius arm; the machine is complete and in first-class condition; can be seen by appointment.—SIR JAMES FARMER NORTON & Co., LTD., Adelphi Iron Works, Salford, 3.

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## MISCELLANEOUS—*contd.*

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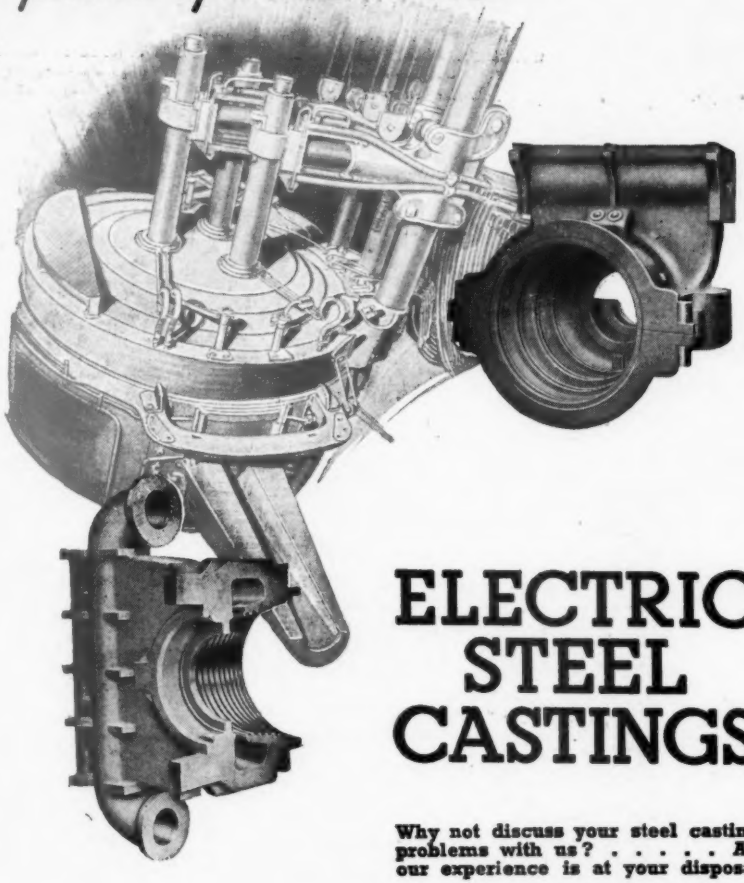

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EST. 1902

VOL. 78. No. 1402
Registered at the G.P.O. as a Newspaper.

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JULY 1, 1943
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LONDON: Winchester House, Old Broad St., E.C.2

CARDIFF: Hannah St., Docks

SHEFFIELD: 45, Blast